COMMERCIAL FISHERIES ABSTRACTS

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FISH TECHNOLOGY EXPERIMENT STATION,
Hoige Bazaar, MANGALORE-1.

0.5 (*) DETOXIFICATION OF SALMONELLA TYPHIMURIUM LIPOPOLYSACCHARIDE BY IONIZING RADIATION

Previte, Joseph J., Y. Chang, and H. M. El-Bisi (Microbiology Branch, Food Division, U.S. Army Natick Laboratories, Natick, Massachusetts 01760)
Journal of Bacteriology 93, No. 5, 1607-1614 (May 1967)

The ability of ionizing radiation to detoxify lethal determinant(s) of the lipopolysaccharide (LPS) of Salmonella typhimurium, S. enteritidis, and Escherichia coli in aqueous solution decreased with radiation doses above 1 Mrad. The ability to detoxify LPS associated with heat-killed S. typhimurium cells in suspension also decreased at doses above 1 Mrad. The 50-percent end point of inactivation was more than 7.0 Mrad for the LPS of heat-killed S. typhimurium and 4.8, 4.5, and 1.0 Mrad for the LPS of S. typhimurium, S. enteritidis, and E. coli, respectively. The LPS of S. typhimurium retained a small portion of its lethal properties after exposure to 20 Mrad, although the LD_{50} (dose lethal to 50 percent of the mice) was much greater than 9.5 milligrams per 20-gram mouse. No inactivation of the lethal determinant(s) occurred after exposure to irradiation doses as high as 20 Mrad at a temperature of -184° C. This lack of activation demonstrated the significance of indirect effect and the mobility and formation of free radicals. The optical density of LPS at 400 mμ increased and pH decreased with increasing radiation doses at 22° C., but no qualitative changes were seen in the infrared spectrum. No change was seen in the pyrogenicity of LPS of S. typhimurium; a
(over)

*Item on back of card.

 ABSTRACTER: M. M. Gwin

2.05 OUTGROWTH AND TOXIN PRODUCTION OF NONPROTEOLYTIC TYPE B CLOSTRIDIUM BOTULINUM AT 3.3 TO 5.6 C

Eklund, M. W., D. I. Wieler, and F. T. Poysky (Bureau of Commercial Fisheries Technological Laboratory, Seattle, Washington)
Journal of Bacteriology 9, No. 4, 1461-1462 (April 1967)

Clostridium botulinum Type E has been shown to grow and produce toxin in the range of 3.3° to 10° C., but the same ability has not been reported for other nonproteolytic types of C. botulinum. The nonproteolytic C. botulinum Type B strain implicated in an outbreak of human botulism in Canada would grow and produce gas after incubation at 6° C. for 6 weeks. Toxin production was not determined, nor was outgrowth at lower temperatures studied.

The present study deals with the growth and toxin production of a nonproteolytic C. botulinum Type B strain in the range of 2.2° to 5.6° C. The strain used in this study was isolated from marine sediment from the Pacific Coast of the United States.

The spores were grown on a cooked-meat medium that was overlaid with a sterile seal. Outgrowth of the spores was indicated by the production of gas bubbles under the seal and was confirmed by assay of the supernatant fluid for Type B toxin. Trypsinized cultures were used for toxin bioassays, and the method of Tint and Gillen (1961) was used to calculate the LD_{50} dose (dose lethal to 50 percent of the injected mice). The lethal toxin was identified as C. botulinum Type B by use of the mouse-protection test.
(over)

 ABSTRACTER: E. R. Weissman

2.02 POST-MORTEM CHANGES IN GLYCOGEN, NUCLEOTIDES, SUGAR PHOSPHATES, AND SUGARS IN FISH MUSCLES--A REVIEW

Tarr, H. L. A. (Fisheries Research Board of Canada, Vancouver Laboratory, 6640 N.W. Marine Drive, Vancouver 8, British Columbia)
Journal of Food Science 31, No. 6, 846-854 (November-December 1966)

Studies of sugars, sugar phosphates, and nucleotides and their post-mortem degradation products in fish flesh are reviewed. The technological significance of these components of fish flesh and their degradation products is discussed, as well as their importance in contributing to fish-flesh flavors.

It had been assumed that fish muscle had a lower glycogen content than mammalian muscles had. However, Tomlinson and Geiger (1962) observed that many species of fish do have a muscle glycogen content comparable with that found in mammals. It is suggested that the excessive struggling involved in most fish-capturing procedures contributes to the low glycogen content in marketed fish. It has also been observed that struggling increases the lactic acid content in the muscles of fish and that this content may increase after death. The lactic acid content is considered to be the principal factor affecting post-mortem muscle acidity. This acidity may affect such adverse post-mortem changes as bacterial spoilage, magnesium ammonium phosphate formation in canned fish, the flesh's ability to hold water, and the chalky condition that often occurs in halibut.
(over)

 ABSTRACTER: E. R. Weissman

2.05 THE GANGRENE ORGANISM--A FOOD-POISONING AGENT

Despaul, John E. (Defense Subsistence Testing Laboratory, Defense Supply Agency, Chicago, Illinois)
Journal of the American Dietetic Association 49, No. 3, 185-190 (September 1966)

The bacteria Clostridium perfringens is very widespread, occurring all over the world, in all bodies of water, in the soil of all lands, and in dust and refuse everywhere. Although it is a normal component of the intestinal flora of man and animals, it does cause gastrointestinal illness when food contaminated with it is eaten; this organism is involved in a high proportion of food-poisoning outbreaks.

C. perfringens is known to be a cause of post-operative infections, gangrene, and various veterinary diseases. It may be used in the gaseous fermentation of cheese and in the microbiologic assay of amino acids. Because of its various attributes and because food contaminated with this organism has little or no objectionable odor or taste, C. perfringens was not associated with food poisoning until well into the twentieth century.

C. perfringens is extremely hardy. Its spores are resistant to radiation, drying, and heat, and they are able to survive in chlorinated water. Spores of the most heat-resistant strains of C. perfringens can live more than 6 hours at the temperature of boiling water. These spores can survive pasteurization and the routine curing and smoking of hams.
(over)

 ABSTRACTER: E. R. Weissman

DETOXIFICATION OF SALMONELLA BY RADIATION

POST-MORTEM CHANGES IN FISH FLAVOR

GROWTH AND TOXIN PRODUCTION OF CLOSTRIDIUM TYPE B

OCCURRENCE OF CLOSTRIDIUM PERFRINGENS

2.02

Little information exists concerning the contribution of sugars and related compounds to fish flavor. Jones (1961) has indicated that high initial concentrations of glucose in fresh fish flesh cause much of its sweetness and that solutions of the potassium salts of the sugar phosphates commonly occurring in fish flesh were "sweetish-salty" in the maximum concentrations found in fresh or chilled fish.

The effect of nucleotides on fish flavor has been studied more than that of sugars and related compounds. Inosinic acid (IMP) is known to enhance the flavors of flesh foods; the uses of this and other nucleotides with fish products has been reviewed by Shimazono (1964). It is believed that truly fresh fish contains more IMP than is necessary to enhance flavor and that the slow conversion of IMP to inosine during storage is probably an important cause of flavor loss. Inosine is considered relatively flavorless, but it contributes to the formation of hypoxanthine, which is bitter and may be largely the cause of bitterness in stored cod. Jones et al. (1964) and Spinelli et al. (1964) have suggested measurement of the increase in hypoxanthine levels in chill-stored fish as an objective indicator of quality.

Maillard-type browning in fish involve sugars and sugar phosphates. Removing free sugars from fish flesh reduces browning, but no practical method for doing so is yet known. Free ribose and glucose have both been found in muscle of dead cod, and the former is about five times as active as the latter in producing browning. [79 references]

2.05

Besides being heat resistant, C. perfringens is able to survive cold storage. Tests revealed that certain strains of C. perfringens, which were able to resist boiling water temperature for over 6 hr., were able to survive for at least 6 months in frozen raw beef stored at 23° and -4° F. Between 33.8° and 68° F., there was slow destruction of vegetative cells and little change in the spore count. Multiplication was rapid at 77° and 98.6° F. Only about 3 percent of the spores germinated before the meat reached 185° F. In meat that was heated and then allowed to cool, almost all of the spores germinated. The author suggests a triple heat treatment for eliminating C. perfringen spores, which would involve heat shock at 185° F., germination at 100° F., and then a heating period at 212° F. to kill the vegetative cells.

C. perfringens food poisoning causes a mild gastroenteritis that is of short duration when compared with more common types of food poisoning. This type of food poisoning is brought on by the ingestion of food heavily contaminated with C. perfringens, such as a meat, poultry, or fish that are prepared some time before serving and then served with inadequate reheating.

Since the spores are so resistant to temperature extremes, the author suggests that the way to deal with C. perfringens in food service is to avoid the conditions in which the spores may germinate and multiply. This fact requires that the food must be kept either continuously hot or continuously cold; either above 140° F. or below 45° F. while being held for serving. [41 references]

0.5

slight decrease in antigenicity during the mouse protection test was seen after 6 days had elapsed between vaccination with LPS and challenge with viable cells of S. typhimurium.

The results were interpreted as evidence that two or more lethal and antigenic determinants of LPS do exist. The differential effects of radiation on the lethal and antigenic properties and on the pyrogenic component(s) are considered as indicative of separate functional sites for activities of a lethal, antigenic, or pyrogenic nature. [31 references]

Webb, W. (Strangeways Res. Lab., Cambridge, England)
Chemical Abstracts 65, 19023b (December 5, 1966)

0.5 THE UTILIZATION OF MAGNESIUM BY CERTAIN GRAM-POSITIVE AND GRAM-NEGATIVE BACTERIA

2.05

Tubes of cooked-meat medium were inoculated with either 2×10^5 or 2×10^6 spores. Visible gas was first observed in the cultures with 2×10^6 spores after 17 days at 5.6° C., after 24 days at 4.4° C., and after more than 109 days at 3.3° C. In the tubes inoculated with 2×10^5 spores, gas production was first observed after 21 days' incubation at 5.6° C., 33 days at 4.4° C., and more than 109 days at 3.3° C.

At 4.4° and 5.6° C., toxin was detected shortly after gas was observed. In general, the toxin titers increased with increased incubation time, but the maximum toxin titers that could be obtained with prolonged incubation at 4.4° and 5.6° C. were not determined. No gas was observed in the tubes incubated at 3.3° C. during the 109-day incubation period. Toxin was detected after 85 days' incubation at 3.3° C. in the tubes innoculated with 2×10^6 spores. No toxin was detected in the tubes less heavily inoculated and incubated at 3.3° C. for 85 days. In another part of the study toxin was detected in tubes inoculated with 2×10^5 spores after 129 days of incubation; toxin titer ranged from 36 to over 200 LD_{50} per milliliter of culture.

In the temperature range of 3.3° to 5.6° C., over 90 percent of the potential Type B toxin was in the form of the protoxin, which was activated by treatment with trypsin.

At 5.6° C., the outgrowth and toxin production of C. botulinum Type B was comparable with that reported for Type E at the same temperature. However, the outgrowth time at 3.3° C. appeared to be longer for Type B than for Type E.

2.1128 EFFICIENCY OF OYSTER DREDGES

Stead, D. H.
Commercial Fishing 5, No. 4, 21, 23-24 (December 1966)

The efficiency of oyster dredges is dependent upon several factors, such as the nature of the bottom, density of oysters and other bottom fauna, depth of water, towing speed, currents, surface conditions, and characteristics of the dredge. Several types of dredges were observed and photographed in action and on the sea bed during diving operations.

Standard large commercial dredge.--The progress of this dredge was jerky as it would halt when a ridge of sediment was built up in front of the bit. Few oysters were missed by the dredge when it was being towed smoothly but more oysters were missed as it overrode the ridge of sediment built up in front of it. Toward the end of the tow the cord meshes became stretched as more material was collected, which reduced the clearing of sediment and lowered the efficiency of the dredge. The dredge recovered 7 percent of the oysters present.

Commercial dredge with diving plate and modified bit.--A standard dredge with a small diving plate fixed at an angle on top of the dredge frame and a corrugated leading edge on the bit was observed in action. In the first test the bottom was firm, flat sand and the bit remained in contact with the ground for most of the tow. The dredge efficiency in this test was 18 percent. In the second test the

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 ABSTRACTER: M. F. Tripple

2.115 TWO YEARS OF AUTOMATION

Anonymous
World Fishing 15, No. 9, 31-33 (September 1966)

Summarized are the experience gained in 2 years of operation of highly automated stern trawlers and the lessons learned from this experience. A member of the English firm that pioneered the development of this type of vessel reports that, on the whole, the firm feels that the experiment has been worthwhile, if not uniformly successful.

The firm initially introduced a 90-foot trawler, which they have found can be handled by a captain and five crewmen during a 14-day trip with continuous fishing. This time is 3 days longer than the usual trip for a vessel of this size. The share of total operating costs represented by labor has dropped from 35 to 27 percent, whereas the crew's earnings have risen. The owners report that they are able to man the ship when conventional vessels are laid up for lack of a crew.

A high degree of automation and attention to the comfort of the crew underlie the reported successes. The controls for both the engine and the winches have been placed in the hands of one man on the bridge. A sheltered work area has made sorting and gutting of the catch easier and more pleasant for the crew.

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 ABSTRACTER: E. R. Weissman

2.114 MAINTENANCE OF A MARINE DIESEL ENGINE

Denholm, J. P. S.
Australian Fisheries Newsletter 25, No. 12, 23 (December 1966)

The newest concept in marine diesel-engine maintenance is that of "overhaul by replacement." For this system to work it is necessary to design the ship with this practice in mind, and for the operator, engine manufacturer, and the local distributor to cooperate in its operation. It is claimed that the benefits to be gained from overhaul by replacement outweigh the disadvantages.

The first requirement is that the vessel be designed so the engine may be easily removed. If a hatch over the engine is not convenient, then some arrangement must be made for slinging the engine forward to remove it end-first.

The operator of the vessel must be sure that during the engine's life it is maintained in accordance with the manufacturer's handbook. He must maintain fairly close contact with the distributor or service engineer so that they can anticipate his requirements for minor overhauls or service exchanges. The operator must keep records of engine performance and requirements and make some preliminary arrangements for service when his vessel reaches harbor.

In return for this effort, the operator may expect: (1) an estimate of engine service and replacement costs for several years in advance, (2) a reasonable

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 ABSTRACTER: E. R. Weissman

2.146 (*) SONAR FOR FISH

Anonymous
Nature 212, No. 5063, 660-661 (November 12, 1966)

The current trend in sonar is to use narrow beams of sound, generally less than 1 degree wide in at least one axis. The narrow sound beams, together with the use of pulses as short as 0.1 msec., increase resolution. However, this combination also decreases the rate of search because only a small volume of water is reached by each pulse and it is necessary to scan with the beam.

Two instruments proposed as solutions to this problem are described. Both instruments are designed to work through a 30 degree sector and to scan this sector electronically from side to side with a receiver having narrow beam acceptance. As the range and bearing of objects are continually changing with time, the display of such a system must necessarily be three dimensional. A film of the oscillograph display from a sector-scanning transducer mounted on a pier clearly showed fish shoals moving with the tide.

Acquiring more information about targets by using different frequencies of sound raises the problem of generating beams of constant width over a wide range of frequencies. At high frequencies this implies physically large transducers. One solution may be in the way in which an acoustic wave of sufficient magnitude

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 ABSTRACTER: M. F. Tripple

EFFICIENCY OF OYSTER DREDGES

MARINE DIESEL-ENGINE MAINTENANCE

LESSONS OF AUTOMATION

SONAR FOR FISHING

2.114

estimate of the time required in port for service and maintenance, (3) less need for extensive mechanical skill in his crew, and (4) his engine overhauled in a properly equipped shop and tested before being reinstalled.

The author outlines a maintenance schedule for a high-speed diesel in a boat that averages a 4- or 5-day trip each week throughout the year. Every morning the oil level should be checked and the engine given a cursory cleanup and inspection. Every month the fuel and oil filters, air cleaners, and mufflers must be cleaned; the lubricating oil must be changed; and the belts and controls checked. Every 4 months the injectors must be changed, using spares kept on board; the cooler and air intakes must be changed; and the turbocharger cleaned if the engine is fitted with one. Every year the cooling system must be drained and flushed; the valves adjusted; and the head bolts and external components must be checked. Every other year the engine is to be given a minor overhaul, and every 4th year it is to be exchanged for a new one.

It is claimed that apart from unforeseen occurrences, only the daily maintenance outlined above need be done while at sea. It is suggested that some of the service periods could be extended, but in a single installation this might be unwise. The author estimates that by using this system the owner will, in effect, have spent an amount equal to the cost of two new engines by the beginning of the 13th year, but that in return he will have an engine that is never more than 4 years old and, on the average, only 2 years old.

2.146

affects the density and bulk modulus of the medium in which it is propagated. The velocity of propagation is a function of acoustic pressure and the crest of the sound wave travels more rapidly than the null point while the trough is retarded. If two waves are superimposed and subjected to this effect, new frequencies can be generated. It is then possible to emit narrow beams of high frequency from comparatively small transducers. The constancy of beam width can be maintained over a 10:1 range in frequency. The drawback of this system is that the power density applied to the transducer is inevitably high and up to 40 watts per square centimeter may be used.

At the present time, electronic circuitry implies high cost and bulk in the transmitting and receiving systems. There is little immediate prospect of these developments becoming useful aids to the fishermen. Nevertheless, with the microminiaturization of circuits and the application of digital techniques, it may not be long before the fish have little chance of avoiding detection, identification, and capture.

(Abstract of this article appears under 2.116 page 11 - January 1967)

Anonymous
Commercial Fishing 4, 23, 25 (January 1966)

2.1128 (Cross Reference: 1.81)

ground was softer and consisted of loose sand and shell. The dredge dug in and often built up banks of sediment, which lowered the dredging efficiency to 3 percent.

Commercial dredge with two bits and double-ring bar.--This dredge was used on a flat, firm pebble shell bottom with an efficiency of 8 percent. The same dredge was used on a firm, flat sand bottom and towed well with an efficiency of 14 percent.

It was concluded that many factors influence the dredge efficiency. Catching efficiency is relatively high when the dredges are working on a fairly firm, flat pebble substrate. On hard sand the oysters are embedded in the sediment and many are missed. Associated fauna may foul the bit and cause it to override the oysters, choke the meshes and reduce filtration efficiency. Dredge efficiency is usually highest at low towing speeds where the bit remains in contact with the substrate and allows adequate clearing of sediment banks. A suitably designed diving plate improves catching efficiency at higher speeds and enables the weight of the frame to be reduced. A dredge with a flexible catch container, such as a steel-ring bag and cord meshes, is more efficient in operation than one with a large, rigid, boxlike container. A flexible dredge allows the bit to keep in contact with the bottom.

The observations suggest that the nature of the bottom is the most important factor influencing dredge efficiency. Dredge efficiency was low on soft bottoms (3-7 percent) and was much higher on hard, firm bottoms (8-18 percent). Flat, hard sandy bottoms permitted more effective dredging than hard pebbly bottoms.

2.115

Lessons have been learned from difficulties encountered in the operation of this vessel. The firm believes that too much enthusiasm for complete automation led to the adoption of systems that are too complicated for use in the present application. It feels that the main and auxiliary engine system is too complex and unreliable. The firm has been unable to find a deckhand capable of looking after the engines and has had to train the vessel's skipper to do so. Another problem has been that the ship's variable-pitch propeller cannot be reversed to help free a fouled net.

The firm has recently introduced a new class of 130-foot semiautomated stern trawlers that have an 11-man crew. The lessons learned from operation of the 90-foot class of vessels were incorporated into the larger ships and have helped make them successful fishing vessels. The only major difficulty experienced with the new ships has been too much of an angle on the stern ramp. The owners report losing some 10-ton hauls because of the steep angle, and heavy costs have been incurred in their adequately reinforcing the trawl. It is felt that the new vessels of this class should be 15 feet longer. Despite this problem, the 130-foot trawler landed the top North Sea catch last year and caught 55 tons of prime fish on a 13-day trip.

Operation of the experimental fish vessels has already allowed the owners to convert four standard trawlers to semiautomated operation at a great saving in wages. The firm feels that experience is the major advantage gained from these experiments.

2.15 FISH HANDLING ON BOARD TRAWLERS AT SEA AND FISH UNLOADING METHODS AT THE DOCK

Stonely, D. R., and R. D. B. Hopkins (Atlantic Bridge Co., Ltd., Lunenburg, Nova Scotia)
Canadian Fisherman 53, No. 10, 32-38 (October 1966)

Methods of handling fish at sea and unloading them at the dock are reviewed. The authors believe that the traditional methods of handling and unloading fish are inadequate and that the time to correct this problem is during the early design stages of new vessels.

Handling fish.--An input conveyor system for distributing the fish around the hold is seen as a possible solution. The conveyor system should be located high in the fish hold so as to be able to plow fish off and deposit them anywhere in the hold by means of a movable chute. The size and location of the fish-entry hatch and the basic design of the fish hold should complement the system of handling adopted. Not only loading, but unloading of the catch must be given consideration when the hold is being designed.

The method of holding fish until they are unloaded is the next point considered. Ice stored in the fish hold and distributed by manual labor is the conventional method for maintaining a low temperature in the hold. The authors suggest several improvements on this system: First, handling the ice in a system of screw
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2.6 A GUIDE TO EUROPEAN FISH MARKETING SYSTEMS

Anonymous
World Fishing 16, No. 1, 22-31 (January 1967)

The following is a résumé of the various systems used by the fishing nations of Western Europe for marketing their catch.

Belgium.--All fish are sold publicly at "Dutch" auctions, in which a relatively high price is set and then gradually reduced until the lot is sold to the first buyer who accepts the price. If the statutory minimum price cannot be obtained by auction, the fish are sold to meal factories or exported to countries outside the European Economic Community. In this case, any price difference is paid to the trawler owner from a fund supported by the government and the fishing industry.

Denmark.--There are two equally important facets to the Danish fishing industry: production of high-quality fish for human consumption and fish reduction. Fish are marketed at auctions held daily at 32 ports; the market is strongly influenced by the fishermen's cooperatives. The sand eel and small herring catch is sold directly to the meal factories, which pay a fixed price. Most of the reduction plants are run by the fishermen's cooperatives. Foreign ships supply a significant portion of the fish sold at auction in Danish ports.

France.--The French market is dominated by the consumer, so the French fishing industry supplies what the consumer demands, rather than providing a basic food
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2.3 GAIN AND LOSS IN THE WEIGHT OF FILLETS DURING PROCESSING AND STORAGE

Castell, C. H.
Fisheries of Canada 19, No. 7, 7-10 (January 1967)

Immersing fish fillets in water, even for short periods of time, causes them to gain weight through the absorption of water. This absorbed water is called "free" water because it is not chemically bound to the proteins; it will usually seep out again within 24 hours. A fraction of the naturally occurring water in the muscle is also in the free state; it may also seep out during storage.

This loss of water is a problem for several reasons. It is of great economic importance to the producer, who buys and sells his fish by weight. To compensate for loss of weight due to seepage, many fish processors pack 110 or 112 pounds of fish in a box supposedly containing only 100 pounds. The lost water creates packaging problems and causes a messy appearance when the fish are packed in plastic bags or cardboard cartons. Water seepage removes water-soluble nutrients and reduces the quality of the fish, and also provides a breeding ground for bacteria. Furthermore, the loss of water decreases the palatability of the fish by changing both its texture and flavor.
(over)

2.6 THE FISH MARKET: CAN IT SURVIVE THE LOSS OF ITS BAIL-OUT FACTOR, THE FRIDAY MEAT BAN?

Lomasney, William F.
Canner/Packer 136, No. 6, 21-23 (June 1967)

Trends in the retail fish market since the removal by the Catholic Church of the ban on Friday meat consumption are reviewed with special emphasis placed on the sociological factors affecting fish sales. Food-industry analysts surveyed the Chicago metropolitan area from December 8, 1966, through April 6, 1967. As compared with sales during the same period 1 year before, all Chicago area food stores and restaurants experienced a varying decline in sales and tonnage of fish. Major supermarket chains reported that fish sales varied greatly between individual stores, districts, and divisions. The volume of fish sales in some stores declined only 2 or 3 percent, whereas in other stores it dropped as much as 20 to 30 percent.

Some factors thought to depress fish sales substantially are as follows. Retail stores patronized by younger people reported the sharpest decrease in sales of fish. Generally, the same drop in sales was true of stores located in predominantly Catholic neighborhoods. Sales also declined in neighborhoods of small apartments with single-person occupancy. Sales were least depressed where fresh fish were available on a continuing basis in supermarkets. Supermarkets
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FISH-HANDLING METHODS

CHANGES IN WATER CONTENT OF FILLETS

EUROPEAN FISH-MARKETING SYSTEMS

TRENDS IN RETAIL FISH MARKET

2.3

The size, type, and condition of the fish determine the rate at which water is lost during storage. A medium to large size cod or haddock, caught in winter or spring, will lose 2 to 4 percent of its weight during 6 or 7 days of storage at 32° F. Softer, summer-caught fish will lose slightly more water under the same storage conditions. Small haddock, young cod, and flounder fillets will lose between 3 and 8 percent of their weight, whereas fillets cut from larger, soft, summer-caught flounders may lose from 10 to 20 percent of their weight during a week's storage at 32° F.

There are several ways of reducing the loss of water from fresh fillets, however, all these processes have disadvantages. A polyphosphate dip is effective in reducing the loss of free water from fresh fillets, but this treatment destroys the preservative action of antibiotics. Brine is also an effective way of reducing water loss. However, this treatment tends to make the fish slightly salty; it increases the sodium content of the fish, and salt is somewhat destructive of the preservative action of antibiotics, though not to the extent of a phosphate dip. A very pure salt might be less damaging in this last respect, but the cheaper salts used in fish processing are generally not satisfactory. It has been found that 10 second's immersion in a 6-percent brine significantly reduces water loss.

The author notes that despite well-meaning attempts at consumer protection, it would be to the benefit of everyone if normal losses of water from fish fillets could be prevented.

2.6

using consistent local newspaper advertising of fishery products, backed by other types of industry promotion, reported a positive correlation between promotion and above-average sales of fish. Larger sized packages of frozen fish maintained a better sales volume than did smaller packages.

The only sector of the fish food market that showed little decline in sales of fish was the area comprised of the better hotels and restaurants, where gourmet fish items are served.

A direct telephone survey of consumers supplied additional information about fish consumption patterns. Forty-five percent of all families surveyed reported fish is served at home at least once a week. Only 36.4 percent of the suburban families served fish once a week, whereas 55.5 percent of the city residents did so. Families buying fish purchased more frozen fish than they purchased either fresh or canned fish. Suburban families ordered fish more often in restaurants than did city dwellers.

Quality was mentioned by 40 percent of the families as being a major objection to serving fish. Family objections, problems of preparation, and limited available selection were also mentioned. More suburban families complained of lack of selection than did city dwellers. None of the families increased their fish purchases during the last year, whereas 35 percent of the families purchased less fish.

Factors that are reported to influence purchase of fish products by shoppers include price, menu variety, family budget, and display of products. Little interest was shown in a greater variety of "heat and serve" fish dinners.

2.15

conveyors; second, considering auxiliary refrigeration to maintain acceptable hold temperatures; third, storing the fish in refrigerated sea water, which would also lend itself to unloading the catch by means of a pump or by removing the refrigerated sea-water tanks from vessels while they are in port.

Another possibility under consideration is freezing the catch in large blocks aboard ship. The authors believe that any automated unloading system adopted on fishing vessels should be designed to handle frozen blocks of fish, as well as round fish stored in ice. One advantage of freezing the fish in blocks would be that they could be stored ashore in that condition, and processing plants could handle them in an orderly manner rather than on a crash basis as they are landed.

Unloading fish.--Details and diagrams of a number of systems for unloading fish holds are given. Some of these systems are presently in operation; others are still under consideration. Basically, there are two ways of automatically removing fish from the hold of a vessel: by a conveyor system or by a pump system. One type of belt-conveyor system is presently in operation. The authors are of the opinion that some sort of "flight bar" system, incorporating a smooth metal tray along which the fish are moved by means of flight bars driven by chains, might be a more satisfactory means of moving fish. Pumping systems, some of which are already in operation, involve moving fish that are entrained either in air (vacuum pumping) or in water.

2.6 (Cross Reference: 1.0140)

supply. Furthermore, the industry is geared to supplying fish on Friday, and to satisfying the demand for quality and variety, Recently, there has been some consumer acceptance of frozen fish, but these frozen products are mostly imported.

West Germany.--The subsidized West German fishing industry faces a number of problems. Distribution methods of the freezer-trawler owners have adversely affected the fresh-fish trade. The processing industry is heavily dependent on imports of Danish herring. Cancellation of the favorable tariff on express goods has adversely affected fish consignments. It is feared that fish will become increasingly more expensive and will eventually be superseded by chicken, eggs, and other substitutes.

Netherlands.--Holland is still the largest exporter of fish in the European Economic Community. Attention is being focused on improving quality. Bonuses are paid for selected kinds of fish when the fish are supplied in nonreturnable boxes and meet certain quality standards.

Norway.--The Norwegian fishing industry is heavily dependent on export, 75 percent of the Norwegian catch being exported. Auctions are not practiced in Norway; almost all fish are sold through the fishermen's sales organizations. These organizations are protected by law. The marketing system is complex and strictly controlled. Of all the landings, 40 percent are sold under minimum price protection; 60 percent at a fixed price.

4.11 (*) ISOMERIC MONOETHYLENIC FATTY ACIDS IN HERRING OIL

Ackman, R. G. (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia), and John D. Castell (Chemistry Department, Dalhousie University, Halifax, Nova Scotia)
Lipids 1, No. 5, 341-348 (September 1966)

Classical procedures have been used in the past to characterize many of the monoethylenic fatty acids of various chain lengths from marine lipids. Further research with advanced techniques for chromatographic separation and oxidative fission, supplemented by gas chromatography, has indicated that mixtures of isomers would probably occur in each of the C-16, C-18, C-20, and C-22 chain lengths. Recognition of different isomers in gas chromatographic analyses, however, was not possible with conventional packed columns because the column efficiencies were too low. Separation of certain monoethylenic isomers of one chain length has recently been shown to be feasible with high-efficiency open tubular polar columns. It is now possible to determine the occurrence of most of the isomers of monoethylenic fatty acids from marine lipids in the even chain lengths by first separating the monoethylenic fatty acids as a class and then using open tubular gas chromatography. Several previously unreported fatty acids were tentatively identified in herring oil after using this procedure combined with ozonolysis.

Monoethylenic fatty acids from herring oil were first concentrated by chromatography on silver nitrate-silicic acid columns, and then the consecutive

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*Item on back of card.

4.11 LOW TEMPERATURE DIRECT METHYLATION OF LIPIDS IN BIOLOGICAL MATERIALS

Dugan, L. R., Jr., Gertrude W. McGinnis, and D. V. Vadehra (Department of Food Science, Michigan State University, East Lansing)
Lipids 1, No. 5, 305-308 (September 1966)

The introduction of gas-liquid chromatography (GLC) and the identification and quantification of fatty acids as their methyl esters have greatly aided lipid analysis. With few exceptions, it has been necessary first to extract the lipids from the biological materials before the fatty acid composition can be determined. The method of McGinnis and Dugan (1965) for low temperature sulfuric acid-methanol methylation of fatty acids in glycerides appeared to be rapid, complete, and without any apparent effect on the fatty acids in various fats with different properties and compositions. This method seemed to be suitable for analysis of the fatty acid composition of biological materials without prior extraction of the lipids.

This paper describes the methylation of fatty acids of lipids from cream, blood plasma, swine liver and kidney tissue, dry yeast, and cells of Staphylococcus aureus. A solution or suspension in ether of the fine particles of lipid-bearing material was made, followed by the addition of concentrated sulfuric acid at low temperatures, and then the addition of absolute methanol. Methanolic KOH was used to neutralize the acid, and the esters were extracted.

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4.29 THERMAL REACTIONS OF METHYL LINOLEATE. I - HEATING CONDITIONS, ISOLATION TECHNIQUES, BIOLOGICAL STUDIES AND CHEMICAL CHANGES

Michael, W. R., J. Craig Alexander, and Neil R. Artman (The Procter and Gamble Co., Miami Valley Laboratories, Cincinnati, Ohio)
Lipids 1, No. 5, 353-358 (September 1966)

This series of papers reports on a study of the chemical changes that occur during the heating of methyl linoleate. Use of methyl ester as a starting material made it unnecessary to convert a triglyceride to a distillable derivative after the heating period and eliminated the risk of artifact production. Use of methyl linoleate, rather than a mixture of unsaturated fatty esters in a naturally occurring ratio, simplified the composition of the mixture of products formed by heating and facilitated interpretation of the results. The methyl linoleate was diluted with methyl laurate to avoid the buildup of excessive viscosity during heating. The authors assumed that any transformations of the methyl laurate taking place under the heating conditions used would be negligible as compared with changes in the methyl linoleate.

The methyl linoleate was heated at 200° C. for 200 hours. Molecular distillation, urea adduction, column chromatography, and gas chromatography were used to separate the reaction mixture. Various fractions were chemically characterized and bioassayed on rats with an acute toxicity test.

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4.29 (*) THERMAL REACTIONS OF METHYL LINOLEATE. II - THE STRUCTURE OF AROMATIC C_{18} METHYL ESTERS

Michael, William R. (The Procter and Gamble Co., Miami Valley Laboratories, Cincinnati, Ohio)
Lipids 1, No. 5, 359-364 (September 1966)

This, the second report of a series, describes the characterization of C-18 aromatic esters from heated linoleate and the independent synthesis of two of the esters. The esters were isolated by a combination of molecular distillation, urea adduction, column chromatography, and gas chromatography, and were characterized by infrared, ultraviolet, nuclear magnetic resonance, and mass spectroscopy.

The data from the analysis of the isolated esters were compared with the data for synthetic esters--methyl 11-(2'-methylphenyl)undecanoate, methyl 7-(2'-pentylphenyl)heptanoate, and methyl 8-(2'-butylphenyl)octanoate. The last two compounds were found to be components of the aromatic fraction isolated from heated linoleate. The synthesis of these two compounds is described in detail. [8 references]

*Items on back of card.

MONOETHYLENIC FATTY ACIDS IN HERRING OIL

DIRECT METHYLATION OF LIPIDS

THERMAL REACTIONS OF METHYL LINOLEATE

THERMAL REACTIONS OF METHYL LINOLEATE

4.11

GLC of the methyl esters was used to determine the fatty acid composition of the various lipid-bearing materials. Methylation of the whole cream at ice-water temperatures was compared with methylation at dry-ice temperatures. The values obtained were compared with values obtained by methylation of the lipids from a total lipid extract of cream. The cream that was methylated at 0° C. showed a faint triglyceride spot when monitored for completeness of esterification by thin-layer chromatography. The fatty acid composition obtained from analysis of the whole cream compared well with the composition obtained from analysis of the lipid extract. The authors concluded that it is not necessary first to remove the lipids from cream in order to make methyl esters of the fatty acids comparable in composition with those from a lipid extract of cream.

When this method was applied to whole plasma, swine liver and kidney, yeast cells, and S. aureus cells, a similar sample-to-sample reproducibility of results was obtained.

The authors believe their results demonstrate both reproducibility of the method and completeness of the reaction. The success of the method when applied to swine liver indicated the applicability of the method on a variety of lipid classes.

The only difficulty encountered with the method is with the short-chain acids because the method involves washing with water, and these methyl esters are quite soluble in water.

4.29 THERMAL REACTIONS OF METHYL LINOLEATE. III - CHARACTERIZATION OF C_{18} CYCLIC ESTERS

Michael, William R. (The Procter and Gamble Co., Miami Valley Laboratories, Cincinnati, Ohio)
Lipids 1, No. 5, 365-368 (September 1966)

This third paper of the series presents the isolation and characterization of the nonaromatic cyclic monomers formed by heating linoleate. The esters were isolated by a series of column chromatographic separations, followed by repeated gas chromatography to obtain fractions containing C-18 cyclic esters. The esters were characterized by infrared, nuclear magnetic resonance, mass spectroscopy, and standard chemical analyses. The isomers found in a complex mixture of cyclic monomers that had been partially separated by column chromatography were also characterized. Use of both physical and chemical methods of analyses allowed characterization of the mixture of isomers without the necessity of separating them from each other. [13 references]

4.29 ISOMERIZATION OF FATS AND OILS. III - ISOMERIZATION OF METHYL OLEATE AND THE METHYL ESTER OF A HIGHLY UNSATURATED FATTY ACID CONCENTRATE WITH IRON PENTACARBONYL CATALYST

Hashimoto, Tetsutaro, and Hisako Shiina (Kogyo Shikensho, Tokyo, Japan)
Chemical Abstracts 65, 18876b (December 5, 1966)

4.11

fractions were examined by open tubular gas chromatography, which confirmed the preferential elution of longer chain length esters and of esters within one chain length with the double bond closer to the terminal methyl group. Isomeric monoethylenic fatty acids with double bonds in positions closer to the carboxyl group than to the approximate midpoint of the even-numbered fatty acid chains could not be adequately separated by gas chromatography and had to be determined by ozonolysis.

The isomers observed were consistent with primary formation from saturated acids through the action of an enzyme that specifically removed hydrogen atoms in the positions Δ^9 and Δ^{10} relative to the carboxyl group. Chain extension of particular monoethylenic isomers by two carbon atoms in the C-20 and longer chain lengths was apparently influenced by the position of the double bond. [50 references]

4.11 ANALYSIS AND CHARACTERIZATION OF POLYUNSATURATED FATTY ACIDS

Holman, Ralph T., and Joseph J. Rahme (Univ. of Minnesota, Austin)
Chemical Abstracts 66, No. 6, 20189j (February 6, 1967)

4.29

Cyclic and aromatic materials were detected in the nonurea adductable monomer fractions. The dimer was separated into polar and nonpolar fractions. The monomeric urea filtrate was toxic when doses of 25 grams per kilogram were administered to weanling rats. The nonadductable portion of the intermediate-boiling fraction was also toxic at the same dose level. The dimer was nontoxic, but after fractionation, the oxygenated polar portion of the dimer mixture was toxic when administered at the 25 g./kg. level. The nonpolar portion showed no evidence of toxicity.

The presence of aromatic monomers in the reaction mixture of a heated fatty material has not been reported before. The mechanism of the monomer formation may involve a proton extraction, followed by ring closure and subsequent transhydrogenation to form the aromatic ester. The isolation, characterization, and syntheses of the aromatic compounds will be reported in a subsequent paper. The polar dimer material contains more oxygen and has a lower iodine value than does the nonpolar dimer. The data support the belief that the polar dimer is a mixture of compounds containing hydroxy, peroxy, and/or carbonyl groups. [34 references]

4.5 (*) RANCID FLAVOR OF EDIBLE OILS.
II - RELATIONSHIP BETWEEN RANCIDITY AND FATTY ACID COMPOSITION

Iwata, Naoki, Masaharu Morita, and Shizuyuki Ōta (Food Research Division, Central Research Laboratories, Ajinomoto Co., Inc., Kawasaki, Kanagawa, Japan)
Journal of Japan Oil Chemists' Society 16, No. 3, 113-119 (March 1967)

The nature and chemical composition of the rancid flavor of various oils, the effects on rancidity of the fatty acid composition of oils, and the extent of oxidation are the subjects of this paper.

Flavors of rancid soybean, corn, and olive oil were evaluated organoleptically. The tests indicated only small differences in the quality of rancid flavors in these oils. Each rancid oil, however, had a characteristic flavor: a "green" or "fishy" flavor in the soybean oil; a "haylike" flavor in the corn oil; and a "heavy" flavor in the olive oil.

Chromatographic analysis of the volatile components of the rancid oils indicated that the major portion of these components was comprised of the degradation products of linoleic acid. In the rancid soybean oil, a large proportion of the decomposition products of linolenic acid was observed in the volatiles; in the rancid olive oil, a small amount of the decomposition products of oleic acid was found in the volatiles. Decomposition products of oleic acid were rarely found in other oils.

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 ABSTRACTER: E. R. Weissman

6.52 HEAT INACTIVATION OF THIAMINASE IN WHOLE FISH

Gnaedinger, R. H., and R. A. Krzeczkowski (Bureau of Commercial Fisheries Technological Laboratory, Ann Arbor, Michigan)
Commercial Fisheries Review 28, No. 8, 11-14 (August 1966)

The heating conditions used by commercial mink-food producers and mink ranchers to destroy thiaminase in whole fish are empirical because the conditions are not based on predetermined time-temperature relations for the thermal inactivation of this antimetabolite. The common practice is merely to cook the fish at 180° to 200° F. for 15 minutes.

Most of the specific data available on the time-temperature relation is found in various publications dealing with the occurrence of thiaminase in fish, or with the chemistry of the enzyme. The time-temperature conditions used by those researchers can be used, however, only as general guidelines by commercial processors. Apparently, no data have been published regarding minimum times and temperatures that are sufficient to inactivate all of the thiaminase in whole fish. Such data would be important in the development of improved fish-reduction methods that are designed to yield safe, high-quality products.

The purpose of this study was to determine the minimum time-temperature relations necessary to inactivate all the thiaminase in several species of freshwater fish. Some of the effects of pH and enzyme concentration on time-temperature relations were also studied.

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 ABSTRACTER: E. R. Weissman

6.10 RISING INTEREST IN FISH MEAL PRODUCTION

Anonymous
Australian Fisheries Newsletter 25, No. 11, 15, 17 (November 1966)

The Fisheries Branch, Commonwealth Department of Primary Industry in Australia, recently made a study of fish meal, which included reports on the world situation, Australian consumption, and market prospects for a local fish-meal industry.

Fish meal has become increasingly important in recent years as a high-quality component of animal feed. It has been shown that owing to the presence of amino acids, vitamin B_{12}, and phosphorus, fish meal has advantages over other protein meals in promoting rapid growth in swine and poultry. With the development of fish-protein concentrate, fish meal may become an acceptable food for human consumption.

In 1964, world production of fish meal was 3.7 million metric tons, as compared with 570,000 metric tons in 1948 and 1.4 million metric tons in 1958. The major increase in world production and export came from Peru, Norway, South and South West Africa, Iceland, Chile, and Angola. These countries accounted for 90 percent of the world exports in 1964. Peru is by far the largest producer and exporter of fish meal. In 1964, Peru produced 1.5 million metric tons, which was about 40 percent of total world production. The largest consumers of fish meal

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 ABSTRACTER: E. R. Weissman

6.54 THE PROTEIN QUALITY OF COTTONSEED PROTEIN CONCENTRATE PREPARED BY TWO DIFFERENT INDUSTRIAL PROCESSES

Bressani, Ricardo, Luiz G. Elias, Silvia De Zaghi, Luis Mosovich, and Fernando Viteri (Institute of Nutrition of Central America and Panama, Guatemala, Central America)
Journal of Agricultural and Food Chemistry 14, No. 5, 493-496 (September-October 1966)

One of the problems in the use of cottonseed-protein concentrate as a food that meets the standards of quality for human use has been the lack of a process for its commercial preparation. A demand for cottonseed protein in both animal and human feed has resulted in the development of new techniques capable of producing a cottonseed-protein concentrate in the form of a high-quality flour.

Further studies, however, have indicated that it is also possible to produce a high-grade flour from cottonseed using ordinary techniques with some modifications. The changes necessary in the prepress solvent-extraction process to make a cottonseed flour for human use have been described by Bressani et al. (1965). On the other hand, the azeotropic solvent-extraction method, using hexane-acetone-water, removes the oil and almost all gossypol and causes little damage to protein.

The authors felt it would be of interest to learn if there were any differences between the protein quality of cottonseed flours prepared by the azeotropic

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 ABSTRACTER: M. F. Tripple

RANCIDITY AND FATTY ACID COMPOSITION

AUSTRALIAN FISH-MEAL PRODUCTION

HEAT INACTIVATION OF THIAMINASE

QUALITY OF COTTONSEED PROTEIN CONCENTRATE

are the United States, Japan, the European Common Market countries, and the United Kingdom. These countries are also large producers, but their production has not kept pace with local consumption, which has generally coincided with an increase in swine and poultry production.

Fish-meal production in Australia rose from 453 metric tons in 1956-57 to 1,083 metric tons in 1964-65. During the same period, consumption of fish meal in Australia was only 1.3 million metric pounds in 1956-57 as compared with 26.7 million metric pounds in 1964-65. Between 1956 and 1965, domestic production of fish meal did not keep pace with consumption. During the 5 years preceding 1963-64, pig production rose by 20 million metric pounds and poultry production by 11 million metric pounds. Production today accounts for only 9 percent of the local requirements. The main source of supply for Australian fish-meal plants is offal from fish-processing plants, which has a protein content of only about 50 percent as compared with 65 percent in imported meal. South Africa is the main supplier of fish meal to Australia.

The demand for fish meal in Australia is expected to increase; however, unless the domestic production increases significantly, most of the local requirements must be met by imports. Exploiting fish specifically for fish meal is one way of significantly increasing products. Stocks of pilchards and other fish suitable for fish meal exist in waters around Australia, and the present demand and high price for fish meal has stimulated interest in a fish-meal industry to exploit these fish.

solvent-extraction process and by the prepress solvent-extraction process. The objective of this investigation was to evaluate by means of animals and humans the protein quality of cottonseed flours produced by the two methods. If no quality differences were found between the two products, the more common prepress-solvent process might be modified with little cost to produce protein of good quality.

The results indicate that a properly modified prepress-solvent method is capable of producing cottonseed-protein concentrates that are as good as those produced by newer techniques for oil extraction. The most consistent differences between the two flours tested was the amount of absorbed nitrogen, which was highest for the flour produced by the azeotropic-solvent method. The amount of available lysine also was highest in the concentrate prepared by the azeotropic-solvent process.

The protein efficiency ratio (PER) assay indicated that concentrate from the azeotropic-solvent method had a higher protein value than the concentrate from the prepress-solvent method had. Nitrogen balance studies at two levels of protein intake indicated equal utilization for the two samples. From growth data, flour from the azeotropic-solvent process appeared to be slightly superior to that from the prepress method. Nitrogen and protein digestibility was best in the azeotropic-solvent concentrate. The authors concluded that either of the modified solvent methods is capable of producing a high-quality product. [16 references]

The small differences in the rancid flavor of these oils appeared to depend on the differences in quantity of volatile compounds and on differences in fatty acid composition of the original oils. The intensity of the rancid flavor in the oils appeared to be related to their peroxide value and to be independent of their fatty acid composition.

Banks, A., and R. Hardy
Chemical Abstracts 66, No. 1, 1676v (January 2, 1967)

The results indicate that a minimum time-temperature relation of 5 min. at 180° F. is necessary to obtain a thiaminase-free product from whole raw fish. From the standpoint of commercial application, this relation implies that the coldest part of any fish must be held at 180° F. for at least 5 min. at some time during heat processing if the antimetabolite is to be inactivated. When fish offal is being processed, the minimum time should be increased to at least 7 min. at 180° F.

At temperatures above 180° F., the thiaminases of different species of fish showed relatively small differences in their heat labilities. At temperatures below 180° F., marked differences began to appear in different fish. There was some indication that a very high content of oil in the fish exerted a protective action against the destruction of thiaminase by heat.

The thiaminase of canned raw fish stored at room temperature was found to remain active for at least 3 months, and the enzyme was not readily destroyed by proteolytic enzymes of the fish. Concentration of the enzyme was determined by the initial activity in the raw fish and was found not necessarily to be related to processing time when different species of fish were compared, but it was related to processing time when single species were compared.

The effects of pH on heat sensitivity of thiaminase were studied on alewife only. High pH tended to increase the heat lability of thiaminase; low pH tended to decrease the heat lability.

7.45 INORGANIC ELEMENTS IN BEEF MUSCLE AND THEIR RELATIVE DEGREE OF BINDING IN AQUEOUS BEEF MUSCLE EXTRACTS

Assaf, Said A., and L. J. Bratzler (Department of Food Science, Michigan State University, East Lansing)
Journal of Agricultural and Food Chemistry 14, No. 5, 487-489 (September-October 1966)

The rate of oxidation of myoglobin present in crude, aqueous beef extracts decreases if the extracts are dialyzed before being frozen and then exposed to light. Also, the addition of metal ions to meat extracts increases or decreases the rate of oxidation of myoglobin, depending on the pH. This study was undertaken to determine the relative degree of binding of some of the elements present in high and low concentrations in beef muscle.

Most of the values for total concentrations of mineral elements in wet, raw beef muscle agree with values previously reported. The amount of phosphorus, however, is somewhat higher than the values in the literature. The phosphorus interferes with the analysis of the other elements in the sample because diluting the sample changes the resultant phosphorus values. The value of sodium also changes whenever the sample is diluted.

The observation of concentrations of the major elements in meat ash gave percentages of the following: K, 38; P, 14; Na, 7.3; Mg, 2.6; Ca, 1.3; Fe, 0.6; and

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 ABSTRACTER: M. F. Tripple

7.593 DETERMINATION OF DNA BASE COMPOSITION VIA DEPURINATION

Huang, P. C., and Eugene Rosenberg (Department of Biochemistry, The Johns Hopkins University School of Hygiene and Public Health, Baltimore, Maryland, and Department of Bacteriology, University of California, Los Angeles)
Analytical Biochemistry 16, No. 1, 107-113 (July 1966)

Quantitative determination of the base composition of deoxyribonuleic acid (DNA) by the usual two-step procedure--complete hydrolysis of the nucleic acid followed by chromatographic separation of the bases--is tedious; moreover, milligram quantities of the DNA are required. Determination of the base composition by analysis of certain physicochemical properties, such as the buoyant density in cesium chloride or cesium sulfate or the temperature of helix-coil transition, requires specialized instruments; in addition, the method, though highly accurate, depends largely on the presence of native DNA. Use of spectrophotometric methods is relatively simple, but the interference caused by the hypochromic effect and the complexity introduced by four simultaneously considered major bases keep the results from being totally satisfactory. The use of bromination to isolate adenine for quantitative determination, although rapid, is limited to salt concentration, is easily affected by chloride ion concentration in the solution of the sample, and requires special care should the sample have a high guanine-cytosine content.

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 ABSTRACTER: L. Baldwin

7.593 A SIMPLE PROCEDURE FOR REMOVING SALTS FROM SAMPLES APPLIED TO ION-EXCHANGE THIN-LAYER PLATES

Foster, John M., Hilary Abbott, and Mary L. Terry (Department of Biochemistry, Boston University School of Medicine, Boston University Medical Center, Boston, Massachusetts)
Analytical Biochemistry 16, No. 1, 149-152 (July 1966)

In 1963 and again in 1964, Randerath described procedures for separating millimicromolar quantities of nucleotides by thin-layer chromatography on ion-exchange celluloses. The sensitivity of the methods was governed by the volume of sample that could be chromatographed. For many biological systems, the volume was limited to the amount of sample that could be applied to the plate before salts in the sample began to interfere. If larger volumes were to be chromatographed, tedious and sometimes impractical desalting procedures were necessary. Interference from salts was avoided in ion-exchange column chromatography provided the sample was diluted enough to lower the salt concentration--the substances to be separated would concentrate in a narrow band at the top of the column as the diluted material flowed through.

That the same technique might apply to an ion exchanger on a thin-layer plate seemed reasonable provided a means could be found for running a volume of the liquid onto the origin of the plate. In the present article, a method is described whereby 10 mμmoles or less of adenine nucleotides was isolated from as much as 0.5 ml. of an incubation medium with no desalting pretreatment.

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 ABSTRACTER: L. Baldwin

7.599 THIN LAYER CHROMATOGRAPHY IN THE STUDY OF NATURAL WAXES AND THEIR CONSTITUENTS

Holloway, P. J. (Department of Pharmacognosy, School of Pharmacy, University of London, W.C.1, England), and S. B. Challen (School of Pharmacy, Portsmouth College of Technology, Portsmouth, England)
Journal of Chromatography 25, No. 2, 336-346 (December 1966)

Introduction.--This report describes a detailed investigation of wax constituents using thin-layer chromatography, with attention paid to the choice of adsorbent, solvent systems, and general and specific methods of detection. The techniques evolved from the investigation were applied to a study of natural waxes from various sources. The study allowed the separation of milligram quantities of wax classes from intact waxes by modifying the basic procedures to a preparative scale on thicker layers of adsorbent.

Adsorbents.--Layers of Kieselgel G and Aluminum Oxide G were both suitable for the resolution of waxes and their constituents. Kieselgel G gave the most consistent separation of all the constituents and waxes. Aluminum Oxide G was less adsorptive than Kieselgel G and gave slightly better separations of nonpolar constituents. The loading capacity of Aluminum Oxide G layers was not as good as that of Kieselgel G and streaking occurred with higher loads, especially when the waxes were chromatographed.

Solvents.--The elutropic series of Trappe (1940) was adopted as a general guide in the design of solvent systems. Complicated multicomponent systems were

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 ABSTRACTER: M. F. Tripple

INORGANIC IONS IN BEEF MUSCLE

DETERMINATION OF BASE COMPOSITION BY DEPURINATION

DESALTING SAMPLES BY CAPILLARY TRANSFER

STUDY OF NATURAL WAXES

7.593

Since the N-glycosidic linkage of pyrimidine nucleosides is more stable than that of purine nucleosides, the purines of calf thymus DNA can be quantitatively liberated by mild acid treatment. This discovery by Tamm et al. (1952) suggested the possibility of spectrophotometrically determining the relative amounts of adenine and guanine in DNA. The feasibility of the method is reported in this article.

Thirteen samples of native DNA were dialyzed at pH 1.58, and the absorption spectra of the dialyzates were measured. The dialyzates contained only adenine and guanine. The ratio of the two, which was reflected by a characteristic absorbance ratio at two selected wavelengths, was unique. Since, in a double-stranded DNA, guanine should be equimolar with cytosine and adenine should be equimolar with thymine, the whole base composition can be determined.

The results obtained, even when the spectrophotometers are not elaborately calibrated, are consistent and the variations are tolerable. Although the $\epsilon_{(P)}$ value of the DNA is extremely sensitive to pH and the ionic strength of the medium, salt concentration does not affect the results. As a consequence, the method can be used either as a substitute for existing methods or as a complement to them. Denatured DNA from the thermal method can be used, for example, since the conditions required for depurination are those required for denaturation of the DNA molecule. DNA samples from buoyant density studies can be further tested by this method, since the salts in the gradient are readily reduced by dialysis. DNA fractions from column chromatography can also be tested, since the proportion of the inner sample to the outer dialyzing medium is easily adjusted. And finally, since purines can be separated from pyrimidines for individual chemical analysis, each base, including the odd bases and, eventually, the single-stranded native DNAs, can be estimated independently. [16 references]

7.599

avoided and only suitable single or two-component solvent systems were used. No single solvent system resolved all the 15 classes of wax constituents studied during one development. A minimum of two solvent systems was necessary for satisfactory resolution: Kieselgel G/benzene-chloroform (7:3 v/v) for compounds of polarity between alkane and fatty acid, and Kieselgel G/chloroform-ethyl acetate (1:1 v/v) for compounds more polar than fatty acids.

From the examination of waxes it was determined that a minimum of two systems must again be used for a separation of all constituents. The separations obtained were dependent upon the proportions and numbers of constituents present in an individual wax.

Detection.--The general methods of detection were found to be successful but responses to the antimony trichloride reagent were variable. An 0.05 percent aqueous spray of Rhodamine 6 G was the most suitable for routine analysis. Fluorescein was a useful alternative to Rhodamine 6 G and the best response was obtained with the reagent incorporated in the adsorbent layers.

Conclusions.--Adsorption thin-layer chromatography was found to be a useful technique for study of the long chain aliphatic and cyclic constituents found in natural waxes. Over 60 natural waxes were successfully resolved in the systems designed, and the authors recommend this method for routine qualitative analysis of waxes. The techniques evolved were also useful in degradative studies and in synthesis of wax constituents, for purity control to detect foreign classes of compound in samples, and in monitoring the fractions collected from column chromatography. During preparation, pure fractions can be isolated from intact waxes that are suitable for further analysis. [25 references] [Trade names referred to in this publication do not imply endorsement of commercial products.]

7.45

Zn, 0.21. The minor elements do not make up more than 0.25 percent; the total percentages of the major and minor elements do not add up to 100 percent. That the elements determined here are not present as free elements, but occur in ash as chlorides, oxides, or other compounds, might explain this discrepancy. Phosphates and oxides are stable at the ashing temperature, but, because the ash is soluble, the phosphates are the most dominant ash form.

The sum of the water-soluble ash fraction and the nonwater-soluble ash fraction may be compared with HCl-dissolved ash. Phosphorus is the most dominant element of the dialyzable ions. The phosphorus value is high because of the interference; however, even after correction for interference, phosphorus ranks first in the nonsoluble-water fraction and second to potassium in the overall concentration. Based on percent solubility (concentration percent of water-soluble fractions in the acid-soluble fractions), the order in solubility of the dialyzable metal ions in the ash is P>Mg>Na>B>Mo>Ca>Zn>Mn>Fe>Cu>Al.

The relative degree of binding of the elements K, Na, and Fe shows that the average concentration of K and Na in the dialyzed extracts is 9.5 and 5.9 p.p.m., respectively. The average concentration of these two elements in the undialyzed control is 388 p.p.m. for K and 62 p.p.m. for Na. The Fe is more tightly bound than the monovalent ions K+ and Na+ so that, whereas 80 percent of the Fe in meat is bound, only 3 percent of the K and 9 percent of the Na are bound.

Analyses of the concentration of the 12 elements in dialyzed extracts, undialyzed extracts, and dialyzate of meat extracts are summarized in a table. The relative degree of binding is in the following order: Fe>Zn>Al>Ca>Cu>Mn>Mo>Mg>B>P>Na>K. [20 references]

7.593

Samples containing about 35 µmoles of mixed salts were individually chromatographed on separate 2-in. by 8-in. plates that had been coated with an ion exchanger. Strips of 2-in. by 10-in. filter paper, thickened at one end by being folded, were inserted between the thin-layer plate and an upper plexiglass plate. The resulting "sandwich" was fastened together with rubber bands and placed on a rack in such a manner that the unfolded ends of the filter paper strips hung over the edge free.

Half a milliliter of sample containing from 5 to 250 mµmoles of nucleotides was diluted with distilled water to 10 ml. The liquid was placed in a covered glass dish and positioned alongside the filter paper-plexiglass-thin-layer plate sandwich, the lower edge of which had been shimmed up till the surface of the liquid was no more than 1/8 in. above the thin-layer plate. A 1.5 by 100 mm. capillary melting point tube was bent at both ends so that one end could be inserted through a small hole in the cover of the dish and the other through a 1/8-in. hole in the plexiglass. The liquid could then flow onto the plate by capillary action.

The transfer of liquid from dish to plate takes several hours. Where they strike the ion exchanger, such highly charged molecules as the adenine nucleotides will remain fixed as a small spot under the tip of the capillary tube. When the sample has been completely transferred, an additional 10 ml. of distilled water is transferred in the same manner to wash the plate. The filter paper is then removed, the plate dried, and the chromatogram developed with an appropriate solvent. The nucleotides, which can be located under ultraviolet light, are then either scraped off for counting or eluted for quantitative spectrophotometric analysis.

7.67 COLUMN CHROMATOGRAPHY IN THE DETERMINATION OF TOCOPHEROL: FLORISIL, SILICIC ACID, AND SECONDARY MAGNESIUM PHOSPHATE

Dicks-Bushnell, Martha W. (Division of Biochemistry, University of Wyoming, Laramie 82070)
Journal of Chromatography 27, No. 1, 96-103 (March 1967)

Columns of activated magnesium silicate were first used about 25 years ago for chemical determinations of tocopherols in biological tissues. Colorimetric analysis with $FeCl_3$-dipyridyl followed this column separation of the materials. When benzene was used as the solvent in these magnesium silicate columns, not only tocopherols, but vitamin A and cholesterol were found in the eluates. Qualitative separation of tocopherol from extracts of cigarette smoke has been accomplished with magnesium silicate columns using hexane-benzene (9:1) as the eluant. Columns of alumina and secondary magnesium phosphate have been used, together with solvent mixtures of ethyl ether and petroleum ether, for analytical separation of the tocopherols from each other, and from carotenoids, vitamin A, sterols, and reducing substances. Silicic acid columns eluted with solvent mixtures of a commercially available n-hexane and ethyl ether (99:1) or hexane and benzene (9:1) have been used to separate tocopherols from other lipid materials. Silicic acid columns eluted with benzene have been used for the quantitative determination of tocopherol in milk.

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7.773 FATTY ACIDS IN NEUTRAL LIPIDS AND PHOSPHOLIPIDS FROM CHICKEN TISSUES

Katz, M. A., L. R. Dugan, Jr., and L. E. Dawson (Food Science Department, Michigan State University, East Lansing 48823)
Journal of Food Science 31, No. 5, 717-720 (September-October 1966)

Fatty acids of phospholipids and other long-chain fatty acids appear to play a major role in lipid oxidation. However, little work has been done on the specific comparison of how much and what kind of fatty acids are present in the phospholipids and neutral lipids of poultry tissues. The present study was designed to determine the amounts and percentages of fatty acids present in the neutral and phospholipid fractions of lipids from skin, dark and white meat, and depot fat of chickens.

The fatty acid composition of lipids from different chicken tissues depends on both the diet fed and on internal synthesis. The rate and extent of oxidative rancidity in meat or separated fat during extended storage is influenced by the degree of unsaturation of the fatty acids. Data on the composition of lipids in chicken tissues should be of value in the manufacture of chicken products and in the control of their stability.

The total content of lipid was lowest in white meat, relatively low in dark meat, higher in skin, and highest in depot fat. The muscle tissues were excised, and all fatty tissues were removed before analysis, which accounts for the low

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7.67 GLASS-FIBER PAPER CHROMATOGRAPHY OF VITAMIN E

Atlas, Susan J., and Karoly G. Pinter (Department of Medicine, St. Luke's Hospital Center, New York, New York 10025)
Analytical Biochemistry 17, No. 2, 258-262 (November 1966)

Introduction.--The disadvantages of gas-liquid chromatography (GLC) are high equipment cost and length of time required for sample analysis. Thin-layer chromatography (TLC) is not as expensive as GLC, but it requires special equipment for the plate preparation. Glass-fiber paper chromatography avoids these drawbacks of GLC and TLC. It is rapid, no special equipment is needed to prepare the plates, and a large number of plates may be prepared and stored in aluminum foil. This report describes a rapid, specific method for vitamin E determination using glass-fiber paper chromatography.

Method.--One ml. of serum is added to 9 ml. of ethanol-isopropyl ether solution (2:1) in a centrifuge tube. The tubes are vibrated, shaken, and finally centrifuged for 10 min. Six ml. aliquots of the extract are dried under a nitrogen stream and reconstituted in 0.3 ml. of iso-octane.

The silica-gel coated glass-fiber papers are prepared by the method of Hamilton et al. (1961). The papers are dried and then immersed in a 2 mg. percent alcoholic fluorescein solution and dried overnight. All following procedures are done in dim light.

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7.879 AN IMPROVED 2-THIOBARBITURIC ACID (TBA) PROCEDURE FOR THE MEASUREMENT OF AUTOXIDATION IN FISH OILS

Yu, T. C., and R. O. Sinnhuber (Department of Food Science and Technology, Oregon State University, Corvallis)
Journal of the American Oil Chemists' Society 44, No. 4, 256-258 (April 1967)

Malonaldehyde is the 2-thiobarbituric acid (TBA) reactive material in autoxidized fat that is responsible for the red color at 532 mμ. The TBA number, or milligrams of malonaldehyde per 1,000 grams of sample, has been proposed as a measurement of the degree of autoxidation of lipids and fat-containing foods.

However, the precision of the TBA method with oils has been questioned. The use of emulsifying agents to promote better mixing of the lipid sample and the TBA reagents has been suggested. The importance of carrying out the TBA reaction in an atmosphere of nitrogen has also been suggested. Reproducible results are difficult to obtain when various TBA procedures are applied to fish oils, so a monophase reaction procedure using ethanol as the reaction medium has been proposed. This method, however, requires careful and lengthy procedures to prevent formation of an interfering color by the ethanol.

The causes of inconsistent results when the TBA determination is applied to fish oils, the air oxidation of lipid samples during the reaction, and methods for the prevention of oxidation are examined. A simplified TBA procedure is presented for the routine testing of fish oils and other lipids.

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Standard solutions are made with 1, 2, 3, and 4 mg. of D-α-tocopherol per 100 ml. of solution. All four standards are included in each experimental run and are used later to construct a standard curve.

Fifty-µl. aliquots of three serum extracts and one standard are applied in duplicate to fluorescein-coated gel papers. The papers are immediately put into ascending chromatography tanks containing iso-octane (200 ml.) and isopropyl acetate (0.5 ml.). After the chromatographic procedure is completed the sheets are removed and examined under ultraviolet light. Vitamin E is visible at R_f 0.4-0.5 as a bright blue line. All other serum lipid components appear green.

Each vitamin E spot is cut out and placed in a centrifuge tube containing 4 ml. of iso-octane-ethanol (1:1). The tubes are vibrated, shaken, and centrifuged; and 3 ml. of the supernatant is transferred to a culture tube for reaction. The colorimetric method of Tsen (1961) is adapted by using bathophenanthrone (0.2 ml.), $FeCl_3$ (0.1 ml.), and phosphoric acid (0.3 ml.). The color is measured within 10 min. at 534 mµ in a spectrophotometer. The vitamin E content of the sera is determined from the known standards that were added to the chromatograms.

Summary.--Lipid classes may be separated by glass-fiber paper chromatography and then analyzed colormetrically with a low cost colorimeter. Glass-fiber paper chromatography was used to separate sugars, amino acids, triglycerides, free cholesterol, and individual cholesterol esters. [17 references]

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Various column chromatography methods were compared as to ability to separate the tocopherols from interferring substances and purify the biological materials for tocopherol analysis.

It was found that quantitative elution of the tocopherols could be accomplished with an activated magnesium silicate column hydrated to 20 percent water and with ethyl ether and a commercial petroleum ether as the solvent. The same column and solvent (or one in which benzene or acetone was substituted for ethyl ether) were capable of separating the tocopherols into three groups (α, β and γ, and δ). It was necessary to hydrate silicic acid to 15 percent water to ensure good recoveries of α-tocopherol when a solvent mixture of petroleum ether and ethyl ether (98:2) was used. It was difficult to wash secondary magnesium phosphate during activation; however, complete recovery of α-tocopherol could be accomplished by deactivating the activated magnesium phosphate with moisture.

Large microgram quantities of coenzymes Q_6 or Q_{10}, which were changed by saponification into reducing compounds, were found to be partially eluted with tocopherols from columns of magnesium silicate, silicic acid, or magnesium phosphate. Reducing compounds of the coenzyme Q type may also be formed on columns of magnesium phosphate and eluted with non-α-tocopherols.

Good recovery of α-tocopherol from rat livers was accomplished, but total tocopherol could not be determined because large quantities of other materials were eluted along with δ-tocopherol. [23 references]

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The formation of a thin film of oil on the sides of the reaction vessel is frequently seen when TBA reagents are added to an oil sample or after the mixture is heated. This phenomenon is believed to be a major cause of inconsistent TBA results with oil samples either because the film of oil is not in contact with the reagents or because the film is subjected to further autoxidation. The formation of the oil film is prevented by coating the glass surface with silicone, which makes the glass water repellent.

Air oxidation during TBA test.--The addition of antioxidants to the reaction system did not alter the absorbency of salmon oil. This indicated that no reaction occurred between malonaldehyde and the added antioxidants. A colorless reagent blank suggested that antioxidants did not interfere with the TBA reaction. The use of the antioxidant mixture to prevent air oxidation of the samples during the TBA reaction proved to be simple and practical for routine TBA tests.

Effect of reagent pH and reagent volume.--When heating time and reagent volume were kept constant, changes in reagent pH altered the results of the TBA tests. The effect of pH was enhanced if no antioxidants were included in the reaction system; the influence of pH was diminished when antioxidants were added. At certain pH values, air oxidation of the oil sample occurred during the reaction. Without antioxidants, the TBA numbers increased when the reagent volume was increased. With antioxidants, air oxidation was prevented and the smallest volume of reagent (6 ml.) gave the highest TBA number.

Peroxide value and malonaldehyde content.--Both peroxide value (PV) and malonaldehyde (MA) increased steadily up to 350 hours of oxidation; after this time both PV and MA started to level off. The PV and MA were in linear relation up to a PV of 800. The authors found that linearity existed between the PV and MA in a complex system such as fish oil.

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values for both white and dark meat. In the past, this type of information has been used to suggest that the development of rancidity will occur primarily in depot fat and skin, with less chance that it will occur in white or dark meat. A different relation appears, however, when the lipids are separated into phospholipids and neutral lipids. White and dark meat contained only 1 and 2.5 percent total lipids; however, 48 and 21 percent, respectively, of this amount was in the phospholipid fraction. On a weight percentage basis, all tissues contained about the same amount of phospholipid material. The high percentage of phospholipids in muscle tissues may make muscles as susceptible to oxidative rancidity as are skin and depot fat.

An analysis of individual fatty acids was made for each tissue because oxidation depends on the presence of unsaturated fatty acids. The percentage of each fatty acid was similar among the four tissues, the greatest variation occurred with arachidonic acid in the phospholipid fraction. The percentage of arachidonic acid was highest in white and dark meat (low-fat tissues) and lowest in depot fat (high-fat tissue). The lipid fraction in the diet of the birds contained about 50 percent linoleic acid; linoleic acid is synthesized into arachidonic acid. This finding indicates that the birds synthesized arachidonic acid and deposited a lower percentage of it in the phospholipid fraction of the skin and depot fat (lipid-rich tissues) than in the meat.

When only whole birds are stored, oxidation occurs first in the skin and depot fat tissues because they are more exposed to air. Many chicken products are cut-up parts or are boneless meat tissues. In this study, the lipids of these tissues were found to contain sufficient polyunsaturated fatty acids to be of concern in the maintenance of the stability of such products. [18 references]

7.89 FROZEN FISH - STORAGE. I - A METHOD OF QUANTITATIVE DRIP DETERMINATION IN FROZEN FISH

Podeszewski, Zbigniew, Edward Kołakowski, and Marian Zięcik
Zeszyty Naukowe Wyższa Szkoła Rolnicza W Szczecinie, Rybactwo Morskie 1, No. 22, 127-138 (1966) (Stettin, Poland)

The physicochemical changes that occur when muscle tissue is frozen can result in the production of drip when the muscle is thawed. It is possible to assess the quality of frozen meat by determining the quantity and nature of the drip obtained from a defrosted sample. Two basic methods are available for obtaining drip from thawed meat: "free drip" (F.D.), which is obtained only by the force of gravity; and "expressible drip" (E.D.), which is obtained by some mechanical means such as a press or centrifuge. The sum of F.D. and E.D. is called total drip (T.D.).

The present methods for collecting drip are not precise enough to base a method of evaluating frozen foods on drip analysis. In collection of F.D., error results from the way in which samples are sliced and positioned during drip collection, the temperature at which the collection takes place, and the inherent biases of the various methods of F.D. collection now used. To circumvent these problems, some investigators work with E.D.. but variables still exist, which make some standardization necessary.

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 ABSTRACTER: E. R. Weissman

7.89 FROZEN FISH - STORAGE. II - CHEMICAL AND PHYSICO-CHEMICAL CHANGES IN EXPRESSIBLE TISSUE DRIP OBTAINED FROM FROZEN FISH FILLETS

Podeszewski, Zbigniew, Marian Zięcik, and Edward Kołakowski
Zeszyty Naukowe Wyższa Szkoła Rolnicza W Szczecinie, Rybactwo Morskie 1, No. 22, 141-149 (1966) (Stettin, Poland)

Samples of herring (Clupea harengus membras L.) and bream (Abramis brama) were frozen and then defrosted to examine the chemical and physicochemical changes that occur in the expressible muscle drip during frozen storage. The herring is a marine fish of medium fat content and the bream is a lean fresh-water fish. The samples were handled in a manner designed to simulate conditions actually found in the commercial handling, processing, and storage of fish.

The gross chemical composition of each species of fish was determined before freezing. The herring contained about six times as much fat, little more ash, less water, and less total nitrogen than did the bream.

After 24 hours of storage at -30° C., the amount of drip was about the same for both species. Longer periods of freezing produced greater quantities of drip and a significant difference between the quantity of drip from each species. At 92 days, the herring produced 19.00 to 20.58 percent drip and the bream produced

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 ABSTRACTER: E. R. Weissman

8.0 PROXIMATE COMPOSITION OF THE PACIFIC COAST DUNGENESS CRAB (CANCER MAGISTER)

Farragut, Robert N., and Mary H. Thompson (Bureau of Commercial Fisheries Technological Laboratory, Pascagoula, Mississippi)
Fishery Industrial Research 3, No. 3, 1-4 (December 1966)

Research on the composition of the Pacific Coast Dungeness crab (Cancer magister) has lagged behind the technological advances in the Dungeness crab fishery. To make processing adjustments when seasonal changes occur in the composition of fresh Dungeness crabs, and to aid in market promotion, the fishery needs data on the composition of these crabs. This paper reports the proximate composition of the Pacific Coast Dungeness crab and discusses significant changes in the crab's proximate composition that result from seasonal variations or from processing.

The commercial season for Dungeness crabs is closed from October through December, which is the spawning season in the area sampled. The nitrogen content of the body meat and offal changed significantly (95 percent or greater) between January and August. The nitrogen content of claw meat decreased significantly from March to June, which coincides with the maturation period for eggs and spermatozoa in June. The nitrogen content of body and claw meat did not change significantly during the period before mating.

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 ABSTRACTER: E. R. Weissman

9.16 TASMANIA TROUT FARM PIONEERS NEW TECHNIQUES

Pownall, P. C.
Australian Fisheries Newsletter 25, No. 8, 23-26 (August 1966)

As conventional methods of obtaining fish become more expensive, other methods such as fish farming, become economically feasible. Denmark, Japan, and the United States have extensive fish farms; Australia and New Zealand have been slow to take up the practice. Two Australian states have now passed legislation allowing the sale of commercially raised trout. New Zealand is also interested in establishing fish farms, but the government has not enacted the necessary legislation.

Trout farming on a limited scale was first tried in Australia in 1960. Ponds were dredged between two rivers and stocked with rainbow trout. Production remained small, and sales were mainly to local residents and tourists. In 1964, a trout farm was built on a reclaimed mudflat at Bridport on the Tasmanian coast. The owner studied trout farming in the United States before beginning his own trout farm.

Although most trout farms operate on fresh water, the Tasmanian farm operates on a combination of salt and fresh water. Trout are anadromous--they breed in fresh water and migrate to salt water to grow. The Tasmanian farm will take advantage of the rapid growth of trout in salt water by pumping sea water into the ponds at the appropriate time. Using a combination of salt and fresh water is an

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 ABSTRACTER: E. R. Weissman

DETERMINATION OF DRIP FROM FROZEN FISH

CHANGES IN FROZEN FISH DRIP

DUNGENESS CRAB COMPOSITION

AUSTRALIAN TROUT FARMING

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26.43 and 27.17 percent drip. The percentage of drip was computed by weighing the samples before and after drip collection.

As time of frozen storage increased, so did the amount of total phosphorus and the acid-soluble phosphorus fraction in the total phosphorus. The amounts increased both absolutely as the total drip increased, and proportionately within the total drip. This was taken as proof of the advancing processes of dephosphorization and deamination within the muscle, even at the low storage temperature.

As storage time increased, dry residue, ash, and total nitrogen decreased, which suggested an increase in the water content of the drip during storage. This might be a result of progressive denaturation of the muscle protein during freezing and its decreasing ability to retain water. Viscosity increased and surface tension decreased during increased time of storage.

The fish used in this study were in the post-rigor state, therefore they were almost completely devoid of adenosine triphosphate (ATP). This lack of ATP permitted a loosening of the muscle fiber structure, which impaired the consistency of the tissue. The changes occurring in such tissue after freezing are thought to be more rapid, and produce a product of lower quality than when they do not occur.

Not only did the two species produce drip of different quantities and different chemical composition, but there were differences in quantity and composition of the drip between males and females of the same species. These differences are thought to reflect the differences in the chemical composition of muscles (mainly the lipid fraction) between the species and sexes and in the enzymatic activity of the tissue of both species. [25 references]

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The following parameters that affect the quantity and quality of collected drip were examined: techniques used in drip separation; types of samples used to obtain the drip; times necessary to obtain drip; amounts of pressure and force necessary to obtain E.D.; and outside temperatures during drip collection. The purpose of these examinations was to find a uniform method for quantitative measurement of drip that would eliminate the inherent problems and fulfill the following requirements: (1) enable a quantitative drip production; (2) obtain a stable drip that would be suitable for qualitative and quantitative examination; and (3) be a simple and universally applicable method.

The following method of collecting free drip was adopted. A sample (8×4×1 centimeter) is cut lengthwise from the dorsal section of the fish and immediately weighed to the nearest 0.01 gram. It is then placed on a net and put in a polyethylene bag that is suspended on an aluminum tray inclined at a 45° angle. The sample is defrosted and the drip accumulated at 2° C. for 48 hours. The sample is removed and dried between two sheets of tissue paper for 20 seconds and weighed again. The quantity of drip is the difference between the two weights. At least 10 samples are to be used for each drip measurement, and the mean computed from the individual results. Fillets placed parallel to the long axis of the collection bag produce about twice as much drip as those placed perpendicular to the long axis. This method produces a greater quantity of drip than any other method in standard use.

A special apparatus for collecting E.D. is described. Samples are prepared in much the same way as described above and are then subjected to a pressure of 0.5 atmospheres per square centimeter for 6 hr. at 2° C. in the apparatus. The authors propose that the E.D. method described be adopted as a standard method for obtaining drip from frozen fish. [11 references]

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effective way of controlling most fresh-water and salt-water diseases. The farm is expected to be relatively disease free. The appearance and quality of the flesh of trout reared in salt water is improved and is more acceptable to buyers.

Bridport was chosen as the site for the trout farm because both fresh- and salt-water rearing techniques could be used economically. A year-round supply of fresh water with a suitable mineral content and with a temperature range of 40° to 70° F. is available. The temperature of the sea water ranges from 50° to 70° F. The growth of trout is directly related to the temperature of the water, and 50° F. is an economical growing temperature.

Earth ponds at Bridport carry up to 1 pound of fish per cubic foot of water. Concrete ponds can carry up to 8 pounds of fish per cubic foot of water. The determining factor as to how much fish a pond can hold is the rate of change of water.

At the present time, dry pellets, industrial fish, and meat offal are fed the trout. Pellets are the only food available throughout the year. One ton of industrial fish is used per day to feed the trout at the farm.

Rainbow trout weighing under 1 pound, which are considered portion-size fish, are currently being sold fresh or frozen in Australia. It is hoped that eventually the trout from Bridport can be used as a substitute for the canned salmon now being imported by Australia.

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A significant increase in the moisture content of the body meat, claw meat, and offal occurred from March to June. The oil content in the body meat and offal changed inversely with the moisture content. The oil content of the claw meat, however, increased 0.4 milligrams per milligram of nitrogen from March to June.

Weight and proximate composition of the Dungeness crab

Type of sample	Time when sample was obtained	Crabs in sample	Weight		Average proximate composition			
			Range	Average	Protein content	Moisture content	Oil content	Ash content
	Date		Grams	Grams	Percent	Percent	Percent	Percent
Body	1/7/63	12	175-220	197	17.5	80.0	1.6	1.36
	3/12/63	12	131-285	199	17.8	79.0	1.5	1.43
	6/3/63	12	136-196	169	16.6	80.3	0.9	1.45
	8/13/63	12	214-286	241	17.1	79.2	0.9	1.54
Claw	1/7/63	12	175-220	197	18.5	80.3	0.8	1.32
	3/12/63	12	131-285	199	18.6	78.5	0.8	1.40
	6/3/63	12	136-196	169	15.2	82.3	1.7	1.91
	8/13/63	12	214-286	241	15.6	81.5	0.7	1.71
Offal	1/7/63	12	175-220	197	14.7	56.7	1.5	15.19
	3/12/63	12	131-285	199	13.6	53.2	0.7	16.29
	6/3/63	12	136-196	169	13.4	61.2	0.5	14.59
	8/13/63	12	214-286	241	14.4	56.8	0.5	14.38

0.34 (*)

METABOLISMS OF NUCLEOSIDES IN BACTERIA III - NUCLEOSIDE-N-RIBOSYL GROUP TRANSFER REACTION IN BACTERIA (2) MECHANISM OF NUCLEOSIDE-N-RIBOSYL GROUP TRANSFER REACTION IN CORYNEBACTERIUM SEPEDONICUM

Sakai, Takuo, Tatsurokuro Tochikura, and Koichi Ogata (Department of Agricultural Chemistry, Faculty of Agriculture, Kyoto University, Japan)
Agricultural and Biological Chemistry 30, 245-253 (March 1966)

The mechanism of nucleoside-N-ribosyl group transfer reaction between pyrimidine nucleoside and purine nucleoside was studied in Corynebacterium sepedonicum. By fractionation, the nucleoside-N-ribosyl group transfer enzyme system was separated into two fractions. In the presence of inorganic phosphate, one fraction split the ribosyl linkage of uridine, producing uracil and ribose phosphate, and the other fraction split the inosine linkage, producing hypoxanthine and ribose phosphate. Analysis of the ribose phosphate revealed that it was ribose-1-phosphate. The two enzyme fractions catalyzed the formation of nucleosides from ribose-1-phosphate and various bases. With ribose-1-phosphate as the intermediate, the nucleoside-N-ribosyl group transfer reaction between pyrimidine nucleoside and purine base was catalyzed by pyrimidine nucleoside phosphorylase and purine nucleoside phosphorylase. [Abstracter: L. Baldwin]

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FINE STRUCTURE AND HOST-VIRUS RELATIONSHIP OF A MARINE BACTERIUM AND ITS BACTERIOPHAGE

Valentine, Artrice F., and George B. Chapman (Department of Biology, Georgetown Univ., Washington, D.C.)
Journal of Bacteriology 92, No. 5, 1535-1554 (November 1966)

The fine structure of a gram-negative marine bacterium, Cytophaga marinoflava sp. n., was studied by ultrathin sectioning and electron microscopy. The bacterial virus NCMB 385 has been shown to be highly specific for C. marinoflava; therefore stages in the morphogenesis of this virus were shown in bacterial cells fixed according to the Kellenberger technique (1956 and 1958). The bacterium consisted of a cell wall, cytoplasmic membrane, and nuclear and cytoplasmic regions typical of bacterial cells. Both the cell wall and the cytoplasmic membrane showed a tripartite structure in that each was composed of two dense layers separated by a low-density zone. Intracytoplasmic membrane systems were also seen, especially in dividing cells and in cells wherein new viruses were being formed. As many as 18 hexagonally shaped, empty phage heads, consisting of membranes only, were seen in untreated, infected bacterial cells. Phage heads were seen that were intermediate in density to empty heads and fully condensed heads. These heads possibly represent stages in the morphological development of the virus. [39 references] [Abstracter: M. F. Tripple]

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ANTAGONISTIC EFFECT ON CLOSTRIDIUM BOTULINUM TYPE E BY ORGANISMS RESEMBLING IT

Kautter, D. A., S. M. Harmon, R. K. Lynt, Jr., and T. Lilly, Jr. (Division of Microbiology, FDA, Washington, D.C.)
Applied Microbiology 14, No. 4, 616-622 (July 1966)

Studies on detecting and isolating Clostridium botulinum Type E have suggested that certain natural contaminants from the mud and viscera of fish from the Great Lakes prohibit the production of toxin. In some cultures this prohibition could be correlated with the presence of a nontoxic organism that was morphologically and culturally identical to C. botulinum Type E. This report describes the effect on C. botulinum Type E of a bacteriocinlike substance produced by these nontoxic organisms.

The bacteriocinlike substance, for which the name "boticin E" is suggested, is bacteriolytic for vegetative cells and bacteriostatic for spores of Type E. The boticin E spectrum of activity is somewhat strain specific. Of the clostridial species tested, only C. botulinum Type E and, to a lesser extent, C. perfringens and C. acetobutylicum are sensitive. The C. botulinum Types A, B, or F are not sensitive. Irreversibly resistant variants originating from vegetative cells and the spores of certain strains were obtained. The active substance was found to be heat stable and dialyzable. It is not inactivated by chloroform, but it is digested by trypsin. Ethyl alcohol and acetone precipitates are quite active but trichloroacetic acid precipitates are only partially active. [23 references.] [Abstracter: M. F. Tripple]

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SYMPOSIUM DISCUSSES RHEOLOGY AND TEXTURE OF FOODSTUFFS

Anonymous
Food Manufacture 42, No. 2, 33-35 (February 1967)

A section of this symposium was concerned with a report on the texture of fish muscle by Dr. R. M. Love of the Torry Research Station, Aberdeen, Scotland. The texture of fish muscle can alter to become either tougher or softer. Toughness is induced by frozen storage when the myofibrils adhere to each other more persistently. It is not known whether this adhesion is the result of increased strength in the cementing agent (sarcoplasmic reticulum) or of decreased flexibility of the fibrils, which would lessen the strain on the cementing agent during mechanical agitation. The dryness of cooked, toughened fish is caused by a redistribution of the tissue water that did not combine with tissue protein during freezing. Chewing such tissue eliminates the bulk of this water, which flows away through the relatively large channels. The remaining protein has a low content of water and does not give the juicy sensation of fresh fish. Softness is a result of advanced spoilage, starvation of living fish, treatment of the fillet with a polyphosphate solution, or other causes. With microscopic examination, homogenates from soft fish always appear pale, and the myofibrils have little contrast and break readily at the Z-band. In soft fish, both actin and myosin seem to be slightly dissolved out. [Abstracter: M. M. Gwin]

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0.5 UPTAKE OF 2,4-DICHLOROPHENOXYACETIC ACID BY PSEUDOMONAS FLUORESCENS

Wademeyer, Gary (Fish-Pesticide Laboratory, U.S. Department of the Interior, Denver, Colorado)
Applied Microbiology 14, No. 4, 486-491 (July 1966)

The factors that influence the uptake of the sodium salt of 2,4-dichlorophenoxyacetic acid (2,4-D) under conditions in which no net metabolism occurs were investigated in order to determine both the significance of "nonmetabolic" uptake as a potential agent for reducing the levels of pesticides and the mechanisms involved.

Temperature, pH, and the presence of other organic and inorganic compounds affected the uptake of 2,4-D. The uptake was more pronounced at pH values of less than 6, which suggested that there may be some interaction between the charged groups on the cell and the ionized carboxyl group of 2,4-D.

Active transport, carrier-mediated diffusion, passive diffusion, and adsorption were studied as possible mechanisms. Uptake was inhibited by glucose, sodium azide, and fluorodinitrobenzene, but 2,4-D was not accumulated against a concentration gradient, a necessary consequence of an active transport system. Isotope counterflow did not occur, nor was the uptake inhibited by uranyl ion. Therefore, carrier-mediated diffusion was precluded as a mechanism. The implication is that uptake probably occurs by a two-step process: sorption into the cell wall, followed by passive diffusion into the cytoplasm. [16 references]

[Abstracter: M. F. Tripple]

0.6 BIOCHEMICAL CHANGES IN FISH PROCESSING

Anonymous
Food Technology 20, No. 7, 73 (July 1966)

The topics covered in this review article of changes occurring in fish during processing are: post-mortem changes, including enzymic degradation; denaturation; oxidative changes in canned tuna; solvent extraction techniques; and fermentation of fatty fish. [Abstracter: M. F. Tripple]

0.6 FOOD FROM NATURAL GAS?

Wheeler, Fred
New Scientist 30, 711 (June 16, 1966)

Edible protein may be converted from methane by the action of bacteria. Laboratory studies have shown that the bacteria are easy to extract from the growth medium and are nontoxic. The use of the bacteria as food depends on the results of nutrition studies and on economic considerations. [Abstracter: M. F. Tripple]

0.34 THE RADIATION-INDUCED OXIDATION OF ORGANIC COMPOUNDS

Dobson, G., and G. Hughes (Univ. Liverpool, Engl.)
Chemical Abstracts 63, 2550e (August 2, 1965)

0.34 PRISTANE IN THE MARINE ENVIRONMENT

Blumer, Max, Michael M. Mullin, and David W. Thomas (Woods Hole Oceanog. Inst., Woods Hole, Massachusetts)
Chemical Abstracts 63, 10357a (October 11, 1965)

0.5 NUTRITION AND METABOLISM OF MARINE BACTERIA
XV - RELATION OF Na^+-ACTIVATED TRANSPORT TO THE Na^+ REQUIREMENT OF A MARINE PSEUDOMONAD FOR GROWTH

Drapeau, Gabriel R., Tibor I. Matula, and Robert A. MacLeod (Department of Microbiology, Macdonald College of McGill University, and Marine Sciences Center, McGill University, Montreal, Quebec, Canada)
Journal of Bacteriology 92, 63-71 (July 1966)

A study of the relation between Na^+-activated transport and the Na^+ requirement of a marine pseudomonad for growth showed that the pseudomonad required 50 to 100 mM Na^+ for maximal rate of oxidation of D-galactose and for the transport of D-fucose-H^3 into the cells. The pseudomonad also required from 150 to 200 mM Na^+ for the oxidation of L-alanine and for the transport of α-aminoisobutyric acid-C^{14} (AIB-C^{14}) into the cells. Competition studies indicated that D-galactose and D-fucose shared common carriers for transporting the compounds into the cells. L-alanine and AIB also shared common carriers. This parallelism in the Na^+ response for oxidation and transport extended to growth when L-alanine was the sole carbon source. With D-galactose as the sole carbon source, an amount of Na^+ equal to that necessary with L-alanine was required. KCN and dinitrophenol inhibited the uptake of AIB-C^{14} by the cells. K^+ and Na^+ were both required for transport. Both Mg^+ and either Cl^- or Br^- were stimulatory. [19 references.]

[Abstracter: M. F. Tripple]

2.05 (*)

INCIDENCE OF MESOPHILIC CLOSTRIDIUM SPORES IN RAW PORK, BEEF, AND CHICKEN IN PROCESSING PLANTS IN THE UNITED STATES AND CANADA

Greenberg, R. A., R. B. Tompkin, B. O. Bladel, R. S. Kittaka, and A. Anellis (Swift and Co., Research and Development Center, Chicago, Illinois)
Applied Microbiology 14, No. 5, 789-793 (September 1966)

The anaerobic film pouch technique was used to quantitate and isolate clostridial spores in 2,358 samples of raw meat, which included 1,078 samples of chicken, 624 of beef, and 656 of pork. Of 19,727 putrefactive anaerobic (PA) spore formers isolated, one was confirmed to be Clostridium botulinum Type C. This isolate was obtained from a chicken sample that contained 5.33 clostridia per gram. These data indicated a very low incidence of botulinal contamination in raw meats at the packing-plant level (0.042 percent of 2,358 samples). The data also indicated an almost 20,000:1 ratio of nonbotulinal PA sporeformers to mesophilic C. botulinum spores. The mean level of PA contamination was 2.8 PA sporeformers per gram of meat; 77 percent of the samples contained three or less PA sporeformers per gram. Statistically significant differences in the incidence of clostridial spores were noted for season, geographical region, and type of meat. [8 references]

[Abstracter: F. Bruce Sanford]

*Item on back of card.

2.12 (*)

EFFECT OF DIRECTION OF SET AND DISTANCE BETWEEN NETS ON THE SALMON CATCH OF TWO GILL NETS

Larkins, H. A., and R. R. French
Bulletin, Int. North Pac. Fish. Comm. No. 14, 59-63 (1964)
World Fisheries Abstracts 16, No. 4, 25-26 (October-December 1965)

During research on high seas salmon, a series of five paired surface gill net sets was fished in the eastern North Pacific Ocean during September 1962. At two of the stations, the nets were set at right angles to each other to determine the effect on salmon catch of the direction of net lie. At the remaining three stations, the nets were set parallel, but with distances of 2, 4, and 8 miles between them, to measure changes in abundance with distance.

Statistical comparisons of the catches of salmon and incidental species indicated that (1) the lie of the net can influence the salmon and pomfret catch; and (2) salmon distribution is quite even with no noticeable change in abundance, over the observed distances, although the abundance of pomfret and Pacific mackerel was quite irregular. [Extractor: L. Baldwin]

*Item on back of card.

2.114 (*)

ADVANTAGES OF TWIN INSTALLATIONS

Anonymous
Australian Fisheries Newsletter 25, No. 12, 26 (December 1966)

The advantages of powering fishing boats with a twin-diesel installation are discussed. This type of installation should be of interest to operators of tuna vessels and trawlers, where maximum power is needed when traveling to and from fishing grounds and less power is needed while fishing.

In a twin installation, power from the two engines is transmitted to a single propeller shaft. A suggested arrangement for such an installation is to place the two engines parallel to each other and parallel to the fore and aft axis of the boat. Each engine would have a clutch and a drive pulley and would transmit power to the shaft by means of a V-belt. Usually a variable pitch propeller is used with power bends to achieve a maximum of power flexibility.

Improvements in design and construction have reduced the size of V-belt transmissions. The belts are now oil resistant and specially treated to eliminate sparks caused by static electricity. The transmissions are considered long-lived; many of the older transmissions have run 30,000 hr. without replacement. These transmissions are quiet and vibration free, and the belts need little attention once they have been tensioned at the end of 24 to 30 hr. running time. Furthermore, a twin installation eliminates the need to handle a large transmission when removing an engine for "overhaul by replacement."

In addition to a wide range of horsepower at the operator's command, a twin installation offers the security of having a "spare" engine in case one breaks down; or one engine may be used to operate gear when fishing.

[Abstracter: E. R. Weissman]

*Item on back of card.

2.6 (*)

EATING FISH NO LONGER AN ACT OF PENANCE

Anonymous
Fishing Gazette 83, No. 13, 16 (December 1966)

The problems and prospects facing the fishing industry as a result of the National Council of Catholic Bishops' ruling regarding the consumption of meat on Friday are reviewed. Opinions within the industry range from dire predictions for the fishing industry to a belief that the image of the industry will be enhanced. The author believes the industry will be better off standing on its own feet than leaning on a compulsory church regulation. Eating fish every day of the week would be a goal for the industry to strive for. The industry also needs to work on presenting the best image to the public and improving the quality of its products.

The author believes that the industry must make better use of the research and development potential offered by the Saltonstall-Kennedy Act fund, which supports work done by the Bureau of Commercial Fisheries. The author also feels that compulsory inspection of fisheries products, as proposed by Senator Hart,† and the action of the Catholic bishops may both be blessings in disguise.

[Abstracter: E. R. Weissman]

*Item on back of card.
†See Card 9.3, page 27.

PATHOGENS

FISHING VESSELS

EXPLORATORY FISHING

FISH MARKETING

2.114 MECHANIZATION OF SMALL FISHING CRAFT

Anonymous
California Fish and Game 51, p. 309 (October 1965)

(Abstract of this article appears under 9.6 page 19 - January 1967)

2.6 HOW HAS VATICAN FRIDAY RULING AFFECTED FROZEN SEAFOOD SALES?

Anonymous
Quick Frozen Foods 29, No. 8, 77-79 (March 1967)

Three months after the Papal decree on meatless Friday went into effect, prices of frozen seafood products were lower than at the same time 1 year before. Prices of fish sticks, fish portions, and fish fillets were all down, whereas prices of shellfish remained about the same. Although the decline in prices of frozen seafoods coincided with the implementation of the Papal decree, packers and brokers generally attribute the drop in price to overproduction. The decline of prices has prompted packers to increase the promotion of fish sales in a variety of ways. [Abstracter: E. R. Weissman]

2.05 LATEST DEVELOPMENTS IN RESEARCH ON BOTULISM

Foster, E. M., and H. Sugiyama (Food Research Institute and Department of Bacteriology, University of Wisconsin, Madison)
Journal of Milk and Food Technology 29, No. 11, 342-347 (November 1966)

An overall view of the world's research effort on Clostridium botulinum was presented at a symposium held in Moscow; this article is a review of that symposium. Research on C. botulinum is expanding, with greatest emphasis being placed on C. botulinum Type E. This organism is widely distributed in the aquatic environment and may be a contaminant of fish and other marine animals. Although a large body of information has been gathered about the characteristics of C. botulinum, much is still to be learned about its ecology and why it occurs in higher concentrations in some environments than in others. Much work remains to be done before the public can be protected with certainty against further outbreaks of botulism. [40 references] [Abstracter: M. F. Tripple]

2.12 DECK SAMPLING OF RESEARCH VESSEL CATCHES

May, A. W., and V. M. Hodder (Fisheries Research Board of Canada Biological Station, St. John's, Newfoundland)
Journal of the Fisheries Research Board of Canada 23, No. 7, 1083-1088 (July 1966)

Two problems face those attempting to examine samples of the catch of a research vessel: the problem of obtaining a random sample from the fish population that may exist at a particular point in space and time, and the problem of subsampling a catch that is too large to be examined as a whole. As a solution to the second of these problems, a method is described that reduces handling of the catch to a minimum, thereby making more time and manpower available for examination of the species caught. [Abstracter: L. Baldwin]

3.15 PRESENT STATUS AND FUTURE PROSPECTS OF FOOD IRRADIATION
(*)

Southern, E. M. (Agricultural Research Council, Meat Research Institute, Low Temperature Research Station, Cambridge, England)
Food Manufacture 42, No. 1, 19-26 (January 1967)

This review article on food irradiation in Britain covers the acceptability of irradiation, its use in the food industry, and its potential applications. Some important points about the application of irradiation to fish are discussed. The fish of highest quality are those caught inshore, which retain good market quality for about 10 days after capture. However, during this 10-day period, the quality of fish does deteriorate. If irradiation is applied to the fish, the author indicates that the initial quality can be maintained up to the time of sale.

Irradiated fish can become contaminated with Clostridium botulinum Type E at temperatures below 4.4° C., although storage below 10° C. usually prevents bacterial spoilage. C. botulinum would appear to be rare in British waters and in samples of fish. If the fish is cooked, though, before being eaten, any toxin present should be destroyed. The author states that this one microbiological hazard would appear to be the only one to occur in irradiated fish.
[Abstracter: M. M. Gwin]

*Item on back of card.

3.63 COMPARISON OF FOOD DEHYDRATION TECHNIQUES
(*)

Hertzendorf, M. S. (Technical Research Dept. of Thomas J. Lipton, Inc., Englewood Cliffs, New Jersey)
ASHRAE Journal 9, No. 2, 65-68 (February 1967)

The following methods for the removal of water, once it has been vaporized, are discussed: (1) atmospheric boiling and evaporation with natural circulation, (2) evaporation under forced circulation, and (3) vacuum evaporation. The presence of air as a diluent of the evolved water vapor allows evaporation below the boiling point of the product, but the low air circulation rate causes high environmental humidity, which alters the desired effect. Forced circulation regulates air humidity by a stream of moving air, causing both heat transfer and removal of vapor. The vacuum method allows water to "boil off" at lower temperatures than the boiling point. The selection of a method can be limited by whether or not the food is to be dried from the solid or the liquid state.
[Abstracter: M. M. Gwin]

*Items on back of card.

4.11 THE COMPOSITION OF ANIMAL ORGAN AND DEPOT FATS IN RELATION TO FEED. III - GAS-CHROMATOGRAPHIC ANALYSIS OF FATS FROM CALVES AFTER DEFINITE FEED
(*)

Kaufmann, H. P., and A. Mankel (Aus der Bundesanstalt für Fettforschung, Münster, Westphalia, W. Germany)
Fette-Seifen Anstrichmittel 68, 645-650 (August 1966)

Feeding experiments were carried out for the purpose of explaining the accumulation of trans fatty acids in animal organs. At the same time, the composition of mixed fatty acids of heart, kidney, and liver, as well as of the corresponding depot fats, was studied by gas chromatography. The fatty acid composition of the separated neutral fat and phosphatide fractions of the organ fats are discussed in this report. [Abstracter: M. F. Tripple]

*Items on back of card.

6.54 FISH PROTEIN CONCENTRATE
(*) A NEW FACILITY IS DESIGNED

Anonymous
Oil-Paint and Drug Reporter 191, No. 7, 28 (February 13, 1967) (Schnell Publishing Company, 100 Church Street, New York, New York 10007)

A plant to produce fish protein concentrate (FPC) has been designed by an Illinois company and is being offered on a "turnkey" basis anywhere in the Free World. The facility may be located on ships, barges, or on land. It will utilize a patented solvent extraction process to provide low-cost high-protein FPC as a food supplement. The standard plant design can process 200 tons of low-grade industrial fish in a 24-hour day. Computer programming is used to fit the plant design to the type of fish to be processed. [Abstracter: M. F. Tripple]

*Item on back of card.

3.63 COOKED DEHYDRATED FISH PRODUCT

British Patent 1,022,169
Abstracts from Current Scientific and Technical Literature 19, Abstract No. 1370, p. 252 (May 1966)

A readily reconstitutable product is obtained by mixing comminuted, cooked fish and a cooked carbohydrate--such as potato, cereal, or starch--and drying thin layers of this mixture to a low moisture content.

(Abstract of this article appears under 6.37 page 9 - May 1966)

3.63 FREEZE VACUUM DRYING OF MARINE PRODUCTS.
IV - TEST ON ONE OF THE EDIBLE KELPS (MAKOMBU)
Kobayashi, Kiichirō, and Shūzō Igarashi
Bulletin of the Faculty of Fisheries, Hokkaido University 15, 58-62 (May 1964)
(Abstract of this article appears under 6.37 page 9 - May 1966)

6.54 EXTRACTION PROCESS WINS PROTEIN FROM FISH

Anonymous
Chemical Engineering 73, 98,100 (February 14, 1966)

(Abstract of this article appears under 6.130 page 13 - October 1966)

3.13 TOXIN PRODUCTION BY CLOSTRIDIUM BOTULINUM, TYPE E, IN VACUUM-PACKED, IRRADIATED FRESH FISH IN RELATION TO CHANGES OF THE ASSOCIATED MICROFLORA

Abrahamsson, Kerstin, N. N. De Silva, and N. Molin
SIK-Publication No. 178 (1966)

(Abstract of this article appears under 2.05 page 3 - May 1967)

4.11 SEPARATION OF HIGHER FATTY ACID MONO-, DI-, AND TRI-GLYCERIDES BY THIN-LAYER CHROMATOGRAPHY

Pokorný, J., and O. Herodek (Dept. Food Chem. and Analysis, Inst. Chem. Technol., Prague, Czechoslovakia)
Analytical Abstracts 13, Abstract No. 1542 (March 1966)

Mono-, di-, and tri-glycerides were satisfactorily separated by development with mixtures of heptane or CCl_4 with from 10 to 20 percent dioxan. Oleic acid derivatives were best separated at 20°, and saturated glycerides at from 30° to 40°. The separated components were detected with 6 percent ethanolic molybdophosphoric acid or with iodine vapor, and were quantitatively eluted from the adsorbent with ethanol or with $CHCl_3$-ethanol. [Abstracter: L. Baldwin]

4.11 CARBOXYMETHYLCELLULOSE: A BINDER
FOR THIN-LAYER CHROMATOGRAPHY OF LIPIDS AND INDOLES
Obretter, Jean B., and Bruce B. Stowe (Department of Biology, Yale University, New Haven, Connecticut)
Journal of Chromatography 16, 226-228 (October 1964)
Carboxymethylcellulose is an effective binder with silicic acid for thin-layer chromatography of fatty acid derivatives and indoles.

DEHYDRATED FISH

PRESERVATIVES - IRRADIATION

MISCELLANEOUS BYPRODUCTS

ORGANIC ANALYSIS

7.51
(*)

TEMPERATURE JUMP STUDIES OF SPERM WHALE METMYOGLOBIN III - EFFECT OF HEME-LINKED GROUPS ON LIGAND BINDING

Goldsack, Douglas E., Wolfgang S. Eberlein, and Robert A. Alberty (Department of Chemistry, University of Wisconsin, Madison 53706)
Journal of Biological Chemistry 241, No. 11, 2653-2660 (June 10, 1966)

The binding kinetics of H_2S and imidazole by sperm whale metmyoglobin in the pH range of from 5.0 to 8.0 were studied by the temperature jump technique. In solution, the combined effect of E-7 histidine residue (pK value of 5.7) and propionic acid residue (pK value of 4.7) could account for the effect of pH on the binding of ligands to the metmyoglobin between pH 5.0 and 8.0.

A systematic method is outlined for analyzing pH-dependent bimolecular rate data for reactions having reactants with several ionizable groups affecting binding kinetics. [14 references] [Abstracter: M. F. Tripple]

*Items on back of card.

7.87
(*)

RAPID METHOD FOR DETERMINING THE DEGREE OF FAT RANCIDITY IN FOOD PRODUCTS

Pokorný, J. (Inst. Chem. Technol., Prague, Czechoslovakia)
Analytical Abstracts 13, Abstract No. 1547 (March 1966)

Procedures for determining peroxide and thiobarbituric acid values are reviewed. A thin-layer chromatographic method for determining oxidized glycerides on alumina, with a mixture of light petroleum, ethyl ether, and acetic acid (80:19:1) as solvent and with 5 percent ethanolic molybdophosphoric acid as detecting agent, is described. [6 references.] [Abstracter: L. Baldwin]

*Item on back of card.

7.599
(*)

ZUR ANALYTIK DER CARBONYL-VERBINDUNGEN UND HYDROPEROXIDE BEI DER AUTOXYDATION OLEFINISCHER FETTE. 2. MITTEILUNG: BESTIMMUNG VON CARBONYLEN NEBEN HYDROPEROXIDEN IN ESSIGSAUREM MILIEU [ANALYSIS OF THE CARBONYL COMPOUNDS AND HYDROPEROXIDES FORMED BY THE AUTOXIDATION OF OF OLEFINIC FATS. II - DETERMINATION OF CARBONYLS IN THE PRESENCE OF HYDROPEROXIDES IN ACETIC ACID MEDIUM]

Linow, F., M. Roloff, and K. Täufel
Fette-Seifen Anstrichmittel 68, No. 10, 866-869 (October 1966) (In German, English summary)

Carbonyl compounds were determined in the presence of hydroperoxides by reacting the sample contained in an acetic acid solution in benzene with 2,4 dinitrophenylhydrazine. The color obtained was measured spectrophotometrically. The method has sufficient sensitivity and reproducibility to be used in model experiments, without fear of interference from hydroperoxides, for determining alkanals, alkenals, and alkdienals quantitatively. In natural substrates, the nonaldehydic carbonyls also may be partially measured by this method. The influence of nonaldehydic carbonyls on the value of the "actual" carbonyl content is discussed. [11 references.]

[Abstracter: M. F. Tripple]

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9.11
(*)

DEEP SCATTERING LAYER MIGRATION AND COMPOSITION: OBSERVATIONS FROM A DIVING SAUCER

Barham, Eric G. (Marine Environment Division, U.S. Navy Electronics Laboratory, San Diego, California 92152)
Science 151, 1399-1403 (March 18, 1966)

The distribution of a myctophid fish and physonect siphonophores was observed during dives of a diving saucer off Baja California. The distribution closely correlates with scattering layers recorded simultaneously with a 12,000-cycle-per-second echo sounder. The organisms were seen while they were migrating vertically, and at their night and daytime levels. The organisms are capable of rapid, extensive changes in depth. [Abstracter: M. F. Tripple]

*Items on back of card.

7.599 LIQUID SCINTILLATION COUNTING OF H^3- AND C^{14} COMPOUNDS IN ANIMAL TISSUES

Elderfrawi, M. E. (Section of Neurobiology and Behavior, Cornell University, Ithaca, New York)
Analytical Biochemistry 17, No. 2, 353-355 (November 1966)

This report describes a simple and rapid procedure using nitric acid for tissue digestion that gives a high counting efficiency for H^3 and C^{14} water-soluble nonvolatile compounds. [Abstracter: M. F. Tripple]

7.599 SÄULENCHROMATOGRAPHIE VON POLYCYCLISCHEN AROMATISCHEN KOHLENWASSERSTOFFEN AN LIPOPHILEM SEPHADEX LH-20
[COLUMN CHROMATOGRAPHY OF POLYCYCLIC AROMATIC HYDROCARBONS ON LIPOPHILIC SEPHADEX LH-20]

Wilk, M., J. R. Rochlitz, and H. Bende (Institut für Organische Chemie, University of Frankfurt, Frankfurt, Germany)
Journal of Chromatography 24, No. 2, 414-416 (October 1966)

9.11 STUDIES ON THE DEEP SCATTERING LAYER.
II - ON THE D.S.L. IN THE OKHOTSK SEA

Maeda, Tatsuaki, Motokazu Ueno, and Noboru Imao (North Pacific Fisheries Research Unit, Faculty of Fisheries, Hokkaido University, Japan)
Bulletin of the Faculty of Fisheries, Hokkaido University 16, 241-250 (May 1966)

The phenomena of the deep scattering layer (D.S.L.) in the Okhotsk Sea were observed during July and August of 1959. These phenomena are caused by the thermocline, the halocline, and the presence of plankton aggregation. In the majority of cases, the D.S.L. was found to lie below 10-30 meters, where both the thermocline and the halocline occur and where the plankton is thick. The results of this research show that zooplankton (mainly Calanus plumchrus) rise to the upper layer before sunset and sink down again toward a deeper layer about sunrise. The deepest level of sinking depends on the minimum level of the dichothermal layer. In the northern region, where the dichothermal layer is shallow, the zooplankton appeared in a 50-75 meter layer; in the southern region, they appeared in a 90-100 meter layer, at the depth of the dicothermal layer.
[Abstracter: M. F. Tripple]

(Abstract of this article appears under 0.5 page 1 - March 1965)

9.11 ROLE OF MARINE FUNGI IN THE BIOCHEMISTRY OF THE OCEANS.
IV - GROWTH RESPONSES TO SEA WATER INORGANIC MACROCONSTITUENTS

Sguros, Peter L., and Jacqueline Simms
Journal of Bacteriology 88, 346-355 (August 1964)

7.51 HISTONES OF MARINE INVERTEBRATES

Palau, J., and J. A. Subirana (Centro de Genética Animal y Humana, Facultad de Ciencias, Universidad de Barcelona, Spain)
Biochemical Journal 101, No. 3, 34P-35P (December 1966)

The basic proteins from sperm whole histones of several species belonging to the phyla Echinodermata and Mollusca were examined. The authors concluded that, if one had to group histones from different sources, those from mammal and echinoderm species could be grouped together and would be far apart from those of the mollusc species. [Abstracter: M. F. Tripple]

7.51 POLYPEPTIDE CHAINS OF IMMUNOGLOBULINS FROM THE SMOOTH DOGFISH (MUSTELUS CANIS)

Marchalonis, J., and G. M. Edelman (Rockefeller University, New York, N.Y.)
Science 154, No. 3756, 1567-1568 (December 23, 1966)

The 17S and 7S immunoglobulins of the smooth dogfish (Mustelus canis) were analyzed for their molecular weights, chain structure, amino-acid composition, and carbohydrate content. The 17S protein had a molecular weight of 982,000; the 7S protein, a molecular weight of 198,000. The proteins had similar amino-acid compositions; both had a carbohydrate content of about 8 percent. The light and heavy chains from the 17S and 7S immunoglobins had molecular weights of 20,000 and 72,000, respectively. It would seem that both immunoglobins belong to the same class and that this class resembles the γM-immunoglobins in higher vertebrates.
[16 references] [Abstracter: M. F. Tripple]

7.87 A GENERAL SCHEME FOR THE DETERMINATION OF RANCIDITY VALUES ON A COMMON SOLUTION OF FATS AND OILS

Pearson, D.
J. Ass. Publ. Analysts 3, No. 3, 76-78 (1965)
Abstracts from Current Scientific and Technical Literature 19, Abstract No. 319, p. 62 (February 1966)

Free fatty acids, acid value, Kreis test, iodine value, and thiobarbituric acid number can be determined by macerating the food in the presence of chloroform.

0.2 CHEMICAL REACTIONS INDUCED BY SOUND

Anbar, Michael (The Weizmann Institute of Science, Rehovoth, Israel)
New Scientist 30, 365-367 (May 12, 1966)

The decomposition of water and organic liquids caused by the action of sound waves has induced scientists to ponder unsuspected processes in nature, including the fixation of nitrogen, which is essential to life. Vibrations in liquids produce violent conditions on a microscopic scale. These vibrations convert mechanical into chemical energy.

Mechanical agitation of a medium can induce cavitation. Examples are provided by sea waves and waterfalls, which may be responsible for nitrogen fixation. This process is a matter of great significance for life in oceans and rivers. It would appear that a substantial fraction of atmospheric nitrogen undergoes fixation by sonochemical processes as well as by the classical methods of bacterial fixation. The fraction of hydrogen peroxide found in natural waters may also be of sonochemical origin.

The intense corrosion and erosion caused by cavitation on the propellers of ships is another example of sonochemistry. Sonolysis of pure organic liquids indicates that hydraulic and lubricating fluids, which are subjected to intense mechanical vibrations, may be broken down. Sonolysis may sometimes be the major factor in the deterioration of these fluids. The mechano-chemical conversion efficiently is low, but enormous amounts of mechanical energy are involved over the long periods of service of such fluids. [Abstracter: M. F. Tripple]

2.5 SEAFOOD AIR TRANSPORT WISELY USED OFFERS SALES ADVANTAGE, SAVINGS

Anonymous
Quick Frozen Foods 28, 105-106, 108 (July 1966)

Airborne imports of fishery products into the United States in 1965 totaled 12.1 million pounds and had a value of $7.3 million. The bulk of these imports were fresh and frozen products. The 9.3 million pounds of shrimp from Venezuela were the main product shipped by air. These figures point to an important area of transportation that could be of considerable advantage to seafood importers and distributors. Despite the high cost, the speed of delivery gives air transport an advantage over other methods of transportation. For example, it enables seafood packers to take advantage of temporary, localized peak prices that are caused by shortages of supplies. Air transportation reduces the need for intermediary storage stops for specialty items that are needed only in limited amounts. Other advantages are that the product arrives in good condition, and it can be shipped to cities that are difficult to reach by truck or railroad. The airlines can also ship small-quantity items.

Disadvantages of air transport include expense, the quality on arrival is not always as good as it should be, and a lack of proper trucking services for air transport perishables on arrival at destination.

[Abstracter: M. F. Tripple]

0.39 SOLUBILIZATION AND CHARACTERIZATION OF A LIPOPROTEIN FROM ERYTHROCYTE STROMA

Morgan, Thomas E., and Donald J. Hanahan (Departments of Biochemistry and Medicine, University of Washington, Seattle)
Biochemistry 5, 1050-1059 (March 1966)

A soluble lipoprotein component containing 94 percent lipid and 6 percent protein was isolated from human erythrocyte stroma by ultrasonic irradiation in a 10-percent 1-butanol solution. Isolation was followed by density-gradient ultracentrifugation. The isolated lipoprotein contained 68-80 percent of the original stromal lipid but only 9-20 percent of the original stromal protein. The lipid distribution was the same as in the intact erythrocyte. In the analytical ultracentrifuge, a single peak (S_r 6.2-12.6) was obtained. On electrophoresis, the lipoprotein moved as a homogeneous band with a mobility comparable to that of plasma α_2-lipoprotein. The lipoprotein was characterized by N-terminal serine and glutamic acid. The amino-acid composition differed from that of other erythrocyte proteins. Low-temperature, ether-alcohol extraction was used to remove the lipid. The residual protein was again characterized. The equilibrium ultracentrifugal technique gave an average molecular weight of 163,000 for the lipid-free protein.

[Abstracter: M. F. Tripple]

3.18 CLEAN SCIENTIFICALLY WITH TODAY'S DETERGENTS

Bartlett, P. G. (West Chemical Products, Inc., Long Island City, New York)
Food Engineering 38, No. 8, 84-89 (August 1966)

The following characteristics of cleaners must be taken into account in considering most cleaning jobs: wetting action, emulsification, dispersibility, solvent action, saponification, buffering capacity and pH, rinsability, chelation, and abrasiveness. The properties and uses of typical commercial cleaners are discussed in this article. [Abstracter: E. R. Weissman]

(Abstract of this article appears under 2.05 page 7 - January 1967)

3.18 SALMONELLA RESEARCH AND SURVEILLANCE PROGRAMS--
BUREAU OF COMMERCIAL FISHERIES

Allen, Harold B.
Proceedings of the Interdepartmental Conference on Salmonellosis, June 3-4, 1965, p. 18

Author	Page	Code
Abbott, Hilary	11	7.593
Ackman, R. G.	7	4.11
Alberty, Robert A.	23	7.51
Alexander, J. Craig	7	4.29
Anbar, Michael	25	0.2
Anellis, A.	19	2.05
Ariyoshi, Shujiro	27	6.195
Artman, Neil R.	7	4.29
Assaf, Said A.	11	7.45
Atlas, Susan J.	13	7.67
Banks, A.	10	4.5
Barham, Eric G.	24	9.11
Bartlett, P. G.	25	3.18
Bende, H.	24	7.599
Bladel, B. O.	19	2.05
Blumer, Max	18	0.34
Bratzler, L. J.	11	7.45
Bressani, Ricardo	9	6.54
Castell, C. H.	5	2.3
Castell, John D.	7	4.11
Challen, S. B.	11	7.599
Chang, Y.	1	0.5
Chapman, George B.	17	0.5
Dawson, L. E.	13	7.773
Denholm, J. P. S.	3	2.114
Despaul, John E.	1	2.05
Dicks-Bushnell, Martha W.	13	7.67
Dobson, G.	18	0.34
Drapeau, Gabriel R.	18	0.5
Dugan, L. R., Jr.	7	4.11
	13	7.773
Eberlein, Wolfgang S.	23	7.51
Edelman, G. M.	24	7.51
Eklund, M. W.	1	2.05
El-Bisi, H. M.	1	0.5
Eldefrawi, M. E.	24	7.599
Elias, Luiz G.	9	6.54
Farragut, Robert N.	15	8.0
Fidler, F.	27	3.2380
Fisher, U.	21	4.11
Foster, E. M.	20	2.05
Foster, John M.	11	7.593
French, R. R.	19	2.12
Gnaedinger, R. H.	9	6.52
Goldsack, Douglas E.	23	7.51
Greenberg, R. A.	19	2.05
Hanahan, Donald J.	25	0.39
Hardy, R.	10	4.5
Harmon, S. M.	17	0.5
Hashimoto, Tetsutaro	8	4.29
Herodek, O.	22	4.11
Hertzendorf, M. S.	21	3.63
Hodder, V. M.	20	2.12
Holloway, P. J.	11	7.599
Holman, Ralph T.	8	4.11
Hopkins, R. D. B.	5	2.15
Huang, P. C.	11	7.593
Hughes, G.	18	0.34
Imao, Noboru	23	9.11
Iwata, Naoki	9	4.5
Jellum, M. D.	21	4.11
Katz, M. A.	13	7.773
Kaufmann, H. P.	21	4.11
Kautter, D. A.	17	0.5
Kittaka, R. S.	19	2.05
Kobayashi, Takaaki	27	6.195
Kołakowski, Edward	15	7.89
Krzeczkowski, R. A.	9	6.52
Larkins, H. A.	19	2.12
Lilly, T., Jr.	17	0.5
Linow, F.	23	7.599
Lomasney, William F.	5	2.6
Lovern, John A.	22	6.54
Lynt, R. K., Jr.	17	0.5
MacLeod, Robert A.	18	0.5
Maeda, Tatsuaki	23	9.11
Mankel, A.	21	4.11
Marchalonis, J.	24	7.51
Mathews, R. A.	27	3.2389
Matsui, Masanao	27	6.73
Matula, Tibor I.	18	0.5
May, A. W.	20	2.12
McGinnis, Gertrude W.	7	4.11
Michael, W. R.	7	4.29
Michael, William R.	7	4.29
	8	4.29
Morgan, Thomas E.	25	0.39
Morimoto, Takao	27	6.195
Morita, Masaharu	9	4.5
Mosovich, Luis	9	6.54
Mullin, Michael M.	18	0.34
Obreiter, Jean B.	22	4.11
Ogata, Koichi	17	0.34
Oritani, Takayuki	27	6.73
Ōta, Shizuyuki	9	4.5
Palau, J.	24	7.51
Pearson, D.	24	7.87
Pinter, Karoly G.	13	7.67
Podeszewski, Zbigniew	15	7.89
Pokorný, J.	22	4.11
	23	7.87
Pownall, P. G.	15	9.16
Poysky, F. T.	1	2.05
Previte, Joseph J.	1	0.5
Rahme, Joseph J.	8	4.11
Rochlitz, J. R.	24	7.599
Roloff, M.	23	7.599
Rosenberg, Eugene	11	7.593
Sakai, Takuo	17	0.34
Sauck, R.	21	4.11
Sedlácek, B. A. J.	23	7.87
Shiina, Hisako	8	4.29
Sinnhuber, R. O.	13	7.879
Southern, E. M.	21	3.15
Stead, D. H.	3	2.1128
Stonely, D. R.	5	2.15
Stowe, Bruce B.	22	4.11
Subirana, J. A.	24	7.51
Sugahara, Michihiro	27	6.195
Sugiyama, H.	20	2.05
Tarr, H. L. A.	1	2.02
Täufel, K.	23	7.599
Terry, Mary L.	11	7.593
Thomas, David W.	18	0.34
Thompson, Mary H.	15	8.0
Tochikura, Tatsurokuro	17	0.34
Tompkin, R. B.	19	2.05
Ueno, Motokazu	23	9.11
Vadehra, D. V.	7	4.11
Valentine, Artrice F.	17	0.5
Viteri, Fernando	9	6.54
Webb, W.	2	0.5
Wedenmeyer, Gary	18	0.5
Wheeler, Fred	18	0.6
Wieler, D. I.	1	2.05
Wilk, M.	24	7.599
Worthington, R. E.	21	4.11
Yu, T. C.	13	7.879
Zaghi, Silvia De	9	6.54
Zięcik, Marian	15	7.89

3.2380 PACKAGING SURVEY

Fidler, F. et al. (Research Department, The Metal Box Co., Ltd., London, England)
Food Manufacture Packaging Survey, 52 pp. (May 1966) (Food Manufacture, Grampian Press, Ltd., The Tower, 229-243, Shepherd's Bush Road, London, W.6, England)

This survey of the packaging industry contains three review articles on developments in gas, cellulose-film, and shrink-film packaging. It also contains tabulated specifications--with supplier--of materials, machines, containers, closures, and pallets. [Abstracter: M. F. Tripple]

6.73 CHEMICAL STUDIES ON AMBERGRIS. PART I - SYNTHESIS OF THE COMPOUNDS WITH AMBERGRIS ODOR

Oritani, Takayuki, and Masanao Matsui (Department of Agricultural Chemistry, Faculty of Agriculture, University of Tokyo, Tokyo, Japan)
Agricultural and Biological Chemistry 30, 659-662 (July 1966)

Ambreinolal, a component of ambergris, was first synthesized by CrO_3 oxidation of ambreinolol. The ambreinolol was obtained from ambreinolide by reduction with $LiAlH_4$. Ambreinolol was converted to the C_{17}-saturated oxide through the monotosylate by treatment with p-toluenesulfonyl chloride in pyridine. A good yield of the oxide was obtained.

Part II - The thermal decomposition and oxidation products of ambrein-tetrahydropyranylether.- Ibid. 663-666.--Ambrein, a major constituent of ambergris, was converted to ambrein-tetrahydropyranylether. Thermal decomposition of the ambrein-tetrahydropyranylether gave back ambrein. The ambrein-tetrahydropyranylether was oxidized to ambreinolal-tetrahydropyranylether in two steps. Ambreinolal-tetrahydropyranylether was synthesized from ambreinolol in four steps and converted to the C_{17}-unsaturated oxide by heating. [Abstracter: M. F. Tripple]

6.73 AMBERGRIS PRIZED BUT HARD TO SELL

Anonymous
Fisheries Newsletter 23, 7 (August 1964)

In earlier days, ambergris was worth its weight in gold, but the introduction of synthetic substances caused the price to tumble. Even so, on the world market it is still believed to be worth about £40 a pound. However, the demand is not great, being restricted to a few manufacturers of high-quality perfume.

3.2389 QUALITY CONTROL OF ODOURS IN PACKAGING

Mathews, R. A.
Grav. Tech. Ass. Bull. 16, No. 2, 76-83 (1965)
Abstracts from Current Scientific and Technical Literature 19, Abstract No. 487, p. 93 (February 1966)

Methods are described, some standard and some unique to particular companies, by which the odor level in packages can be checked and standards decided for an acceptable level of odor.

6.195 THE NUTRITIONAL VALUE OF D-AMINO ACID IN THE CHICK NUTRITION

Sugahara, Michihiro, Takao Morimoto, Takaaki Kobayashi, and Shujiro Ariyoshi (Research Laboratory of Amino Feed Industry Co., Ltd., General Research Laboratories of Ajinomoto Co., Inc., Yokohama, Japan)
Agricultural and Biological Chemistry 31, No. 1, 77-84 (January 1967)

This investigation of the nutritional values of D-isomers of 16 amino acids (D-amino acids) on chick growth used purified diets containing crystalline amino acids as the sole source of nitrogen. Records were kept on growth rate, feed consumption, and nitrogen retention. Comparison of chicks fed the purified diets with control groups fed a diet containing only L-amino acids and also with negative control groups fed a diet without the corresponding L-isomer led to a determination of the nutritional values of the D-amino acids. The results obtained with the essential amino acids are as follows: (1) methionine, phenylalanine, leucine, and proline were equal or about equal in nutritional value to the corresponding L-isomer; (2) valine was one-half the nutritional value of the corresponding L-isomer; (3) tryptophan, isoleucine, and histidine were of small nutritional value as compared with the corresponding L-isomer; and (4) lysine, threonine, and arginine had no nutritional value. The following results were obtained with the nonessential amino acids: (1) serine, tyrosine, and cystine were about equal in nutritional value to the corresponding L-isomer; (2) alanine suggested the possibility of a slight growth retardation effect; and (3) aspartic acid produced a growth retardation effect. [26 references] [Abstracter: M. M. Gwin]

9.3 HART INTRODUCES FISHERY INSPECTION BILL

Reprinted from a speech by U.S. Senator Philip A. Hart, Congressional Record, October 18, 1966
Fishing Gazette 83, No. 13, 14, 25 (December 1966)

This article is an explanation of Senate Bill, S. 3922, which provides for inspection of fish and fishery products by the U.S. Department of the Interior. The principal areas covered by the bill concern health, hygienic, and economic safeguards. Health safeguards would include inspection of all imported and domestic edible fish and shellfish to be sold in interstate commerce and large marketing areas. Hygienic safeguards would cover sanitary inspection of processing plants and equipment. Minimum product standards of quality would be established. The Senator points out that the provisions of the bill will both assist and upgrade U.S. fisheries, especially in promoting more consumer confidence in fisheries products. [Abstracter: E. R. Weissman]

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DEPARTMENT OF THE INTERIOR
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Created in 1849, the Department of the Interior--a department of conservation--is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States--now and in the future.